THE SEA-MANS KALENDER:

OR

An Ephemerides of the Sunne, Moone, and certaine of the most notable fixed Starres.

The twelfth Impression; Newly Corrected: With some Additions.

LONDON.
Printed by B. Alsop and T. Fawcet, for John Tap, and are to be sold at his shop at Saint *Magnus* corner.
Anno Dom. 1631.

To the right Worfull. Sir IOHN PAITON Knight, Gouernour of his Majesties Isle of *Iersey*, I. T. wisheth worlds pleasure and heauens happinesse.

THE Bee (right Worshipfull) by serious industry gathering a certaine hidden vertue from sundry sortes of Flowers and Hearbes, and making thereof (by labour and trauell) a materiall Lumpe, namely the Hony-combe: is not therefore to be condemned by any, but rather commended of all. The Physician of many simples making one compound medicine, doth not onely thereby reape profit to himselfe, but applauditie to others: And the studious Reader, out of many Authors select some chiefe principles which hee recordeth as memorials, either to profit himselfe, or to pleasure others.

Of these two comparisons, the first is excellent for imitation in generall: the second very necessarie for diuers in particular: and the last (though not so highly esteemed of the common sort of people, by reason of their ignorance in Arts and Sciences, yet for the good that may come thereby to a Common wealth) nothing inferiour to the best: especially, where their study tendeth to good and vertuous exercises, or the practise and contemplation thereof to laudable Arts and Sciences. Of which Arts, namely, Mathematicall, Nauigation being a principall member, as hauing participation in Arithmeticke, Geometrie, Geography, Cosmography, & Astronomy, or rather to say the truth; being the quintessence of them all, yea the proofe and triall of them: for albeit that men reade or heare neuer so much of Cosmography or Astronomy, yet without practise and experience it is vnperfect: and how can perfection bee attained, but by sayling, and transporting from place to place, thereby beholding the diuersitie of dayes and nights, with the temperature of the Ayre in sundry Regions, whereby the

whole course and reuolution of the Sphære is made apparant to Mans capacitie? And by what meanes can Sayling bee performed, but by Nauigation? Which so being, it may be affirmed, that as the Mathematicall Sciences are the grounds of Nauigation, so is Nauigation the onely meanes, whereby the excellencie of those Arts and Sciences, are proued and layd open to the view of the World. Therefore very aptly may Arts bee tearmed, The mirrour of Nature; because that by Artes, the wonderfull and hidden secrets of Nature are reuealed: and Nauigation may be called, The tryall of Arts, being that thereby the whole study of Arts is proued to bee true. The reasons mooving mee, as also being many times conuersant with Sea-men and Mariners, whereby I perceiued what they (I meane the common and plainer sort of them) chiefely desired: at my best leysure I made a collection of such Tables and Rules, as I thought fittest for their purposes: and being instantly vrged by diuers to publish them, although I was very loath to aduenture my simple labours to the common view of carping censurers: Yet at last (hoping well for the best, and not greatly respecting the worst) I resolued to hazard my papers to the Presse, and (as the common custome of the world is) thinking vpon a Patron, to protect it from the malicious slaunders of malignant spirits, I presumed vpon your Worships fauour in two respects: The one in consideration that your selfe being so well acquainted in the Artes Mathematicall, would (though not in respect of the Author, yet for affection to the matter) vouchsafe the protection of them: The other, that being in duty bound to be at your Worships pleasure, I know not how I might shew my selfe dutifully affected, better then by dedicating my (though vnpolisht yet well-willing) labours to your fauourable disposing, beseeching your Worship to accept of them, and to pardon my boldnesse; and so with my daily prayers to God for your health and prosperous successe in all your actions, I rest:

Your Worships most dutifully,
to bee commanded,

IOHN TAP.

TO THE COVRTEOVS READERS HEALTH.

GEntle and indifferent Readers, whose judgments are not so Sophistically mixed with humorous conceits, and quipping quidities, (as many are now a dayes) who are apter with their turbulent tongues to condemne all things, then with sensible judgements to amend any thing: as for them or any such carping Zoylists, I am indifferently perswaded to set as lightly by their partiall and iniudiciall censures, as they are farre from hauing a good opinion of ought but what is agreeable to their own fantastical fictions: Only to thē that are of more plausible spirits and grauer judgements, who (for the most part in reading) applaud that which is good, and passe ouer with silence that which is not hurtfull, without scoffing at the worke, or deriding the Author; and to those that hauing small vnderstanding, are desirous of more knowledge in the Art of Nauigation, and other Mathematicall studies: To the one I commit the censuring of my worke, and to the other the profit of my labours: knowing that the wise will rather winke at small faults, then rashly reproue that which may profit others, though not pleasure themselues. And though (as I say) the curious and expert Mariners finde nothing herein contained which may satisfie their expectation, yet I hope they will judge fauourably of my intention, and with patience passe it ouer for affection to the Art it selfe, wishing charitably that my skill were answerable to my will As for the meaner sort, whose experience haue not beene fitted with Arts rudiments, nor

their iudgements fined with demonſtratiue illuſtrations in the Mathematicall Sciences, but onely are now (as it were) ſetting themſelues with willing minds to learne what they before wanted; I make no queſtion, but as by theſe following Tables and Propoſitions they may reape profit, ſo accordingly, yeelding friendly cenſures vpon mee and my workes, they ſhall anſwere my expectation, with a full recompence of my paſſed labours. Further, I haue added hereunto for the better confirmation of my loue vnto the practicers in this Art: I meane ſuch as are not acquainted with the doctrine of Triangles, the explanation of Maſter *Ralph Handſons* 5. Nauticall Diagrams in his 5. ſeuerall Caſes for finding the Sunnes Azimuth, by him wrought by the Canon of Triangles in *Pitiſcus*, and here aplyed onely to the abridged Table of Sines, towards the latter end of this Booke. Further intreating the curteous Readers to doe me that fauour, as to correct what they ſhall finde amiſſe, either in the Printers ouerſight, or mine owne error, and I ſhall not onely endeuour the mending of them in the next Impreſſion: but alſo bee very thankefull to them that at any time ſhall giue me notice thereof, reſting withall.

Your obliged friend,

IOHN TAP.

☞ The Propoſitions follow.

Certaine Definitions, meete to bee vnderſtood of thoſe that will practiſe Nauigation.

A Sphære or Globe, is a round figure, made by the turning of halfe a Circle, till it end where it began to be moued; or a maſſie body incloſed with one platforme or ſurface: In the middle whereof is a pricke, from which all Lines drawne to the ſurface are equall.

Center, is the point or pricke aforeſaid, in the middle of a Sphære, Globe or other Circle.

Diameter, is a right Line drawne through the Center, to the Circumference or ſurface of a Sphære or Circle to each ſide thereof.

Circumference, is a round Circle equally diſtant on all ſides from the Center thereof.

Surface or Superficies, is the vpper part of any thing.

A Degree, is the 360. part of a Circumference of any Circle.

A Minute, is the 60. part of a Degrée, being vnderſtood of meaſure: but in time, a minute is the 60. part of an houre, or the fourth part of a degrée, 15. degrées anſwering to an houre, and 4. minutes to a degrée.

The Pole, is a poynt or a pricke imagined in the heauens whereof are 2. the North Pole being the Center, to a Circle deſcribed by the motion of the North Starre, or the taple of the little Beare: from which poynt aforeſaid, a line imagined to paſſe through the Center of the earth and paſſeth direatly to the oppoſite part of the heauens, ſhewth the South Pole.

The Equinoctiall, is a great Circle imagined in the heauens: alſo deuiding the heauens into 2. equall parts, and lying iuſt in the middle betwéene the two Poles, being in compaſſe from Weſt to Eaſt, 360. degrées, euery degrée of terreſtriall meaſure, valuing 20. Engliſh leagues or 60. miles.

The Meridian is a great Circle, deuiding the Equinoctiall at right angles into two equall parts, passing also through both the Poles and the Zenith: to which Circle the Sunne comming twice euery 24. houres, maketh the middle of the day, and the middle of the night.

Note that euery place hath a seuerall Meridian, which doe all meet together in the Poles of the world.

Zenith, is a point or pricke in the Heauens, right euer our heads, 90. degrées from the Horizon, as the Pole is 90. degrées from the Equinoctiall.

Nadir, is a point or pricke in the heauens vnder our féete, opposite to the Zenith.

Horizon, is a great Circle, deuiding that part of the Heauens which we sée, from the other part we sée not.

Azimuth, is a great Circle, crossing the Horizons at right angles as the Meridians doe the Equinoctiall, being as many as the Meridians: and as the Meridians concurre and méete together in the Poles of the world, so doe the Azimuthes méet in the Zenith, which is the Pole of the Horizon.

Parallels, are Lines or Circles equally distant in all parts one from another, as all Circles of East and West are parallel to the Equinoctiall.

Almicanterahs, are Circles parallel to the Horizon, being also Circles of Altitude or Eleuation, being that the Altitude of the Sunne, Moone, or Starres aboue the Horizon are described thereby: which Almicanters doe crosse the Azimuths, as the Parallels or Circles of East or West doe crosse the Meridians.

The Tropickes, are two lesser circles parallel to the Equinoctiall, limiting the bounds of the Zodiacke or the greatest declination of the Sunne on each side of the Equinoctiall. The Tropicke of Cancer Northward, and the Tropicke of Capricorne Southward, whose distance from the said Equinoctiall are 23. deg. and 31. min.

The Zodiacke, is a great Circle crossing the Equinoctiall in two opposite places thereof and warning byas-wise there-from towards eyther of the Poles, touching the Tropick of Cancer on the North

North part, and the Tropick of Capric on the South part thereof. In the Zodiacke are 12. Signes: viz. Aries, Tau. Gem. Can. Leo. Virg. Libra, Scorp. Sagit. Capr. Aq. Pisces, every signe being 30. deg. in length, and 12. in breath: through which signes the Sunne passing describeth a yeare, and the Moone passing likewise through the same maketh a Moneth; the 12. degrees that the Zodiacke hath in breath, are allowed for the Latitude of the Planets.

Ecliptick, is a Circle lying just in the middle of the Zodiacke, out of which the Sunne never goeth, but the Moone and other Planets are sometime on the one side, and sometime on the other side thereof, in which the head and tayle of the Dragon also is.

The head and tayle of the Dragon, are two opposite points in the Ecliptick line of the Zodiacke, which goeth backward through all the 12. Signes in 19. yeares: And when it happeneth that the Sunne and Moone are in Conjunction, in that place of the Ecliptick where the head or tayle of the Dragon is, then is the Sunne eclipsed, and being in the Oppositions, the Moone being in eyther of the said points, the Moone shall be Eclipsed.

The Circle Articke is a Circle which includeth all those starres which doe never rise or set in any latitude, but are alwayes above the Horizon where the North pole is raised: the like is understood of the Circle Antarticke, where the South pole is raised.

The Polar Circles, are 2. little circles distant from the Poles of the world, so much as is the greatest declination of the Zodiacke from the Equinoctiall: in which Polar Circles are the Poles of the Zodiacke.

Colures, are 2. great Circles passing through both the Poles, crossing one another in the said Poles at right angles, and deviding the Equinoctiall and the Zodiacke into 4. equall parts, making thereby the 4. seasons of the yeare. The one Colure passing through the Equinoctiall points of Aries and Libra, sheweth the beginning of the Spring time and Autumne, which 2. times, the dayes and nights are equall. The other Colure passing through the 2. Tropicall points of Cancer and Capricorne sheweth the beginning of the Summer and Winter: at which 2. times, the daies and nights are longest and shortest.

Altitude, in the Heauens, is the height of any thing aboue the Horizon towards the Zenith.

Latitude, is the wideneſſe or diſtance of the Planets or Starres from the Eclipticke, either Northward or Southward. Alſo Latitude is the diſtance of the Zenith of any place from the Equinoctiall, towards either of the Poles, which is alwayes equall to the height of the Poles of the ſame place.

Longitude, is length, and in the heauens it is vnderſtood the diſtance of any Starre or Planet, from the beginning of Aries to the place of the ſaid planet or ſtarre, or from the beginning of any line to a certaine other part or degrée of the ſame line: Otherwiſe longitude in the earth, is the diſtance of the Meridian of any place, from the Meridian which paſſeth ouer the Iſles of Azores, where the beginning of longitude is ſaid to bee Longitude, is counted vpon the Equinoctiall, and Latitude vpon the Meridian.

Declination, is the declining or diſtance of the Sun, Moone, or Starres from the Equinoctiall, and is ſaid to be North or South, according to the Pole towards which it leaneth.

Amplitude, is the diſtance of the riſing and ſetting of the Sun, Moone or Starres, from the true Eaſt or Weſt point of the Compaſſe vpon the Horizon.

Aſcention, is the riſing of any Starre, or of any portion of the Eclipticke aboue the Horizon. Right Aſcention, is the number of deg. and minutes of the Equinoctiall, which commeth to the Meridian with the Sun, Moone, Star, or any portion of the Eclipticke. Oblique Aſcention, is the numbers of degrees of the Equinoctiall, Starre or any portion of the Eclipticke: in which ſort is Oblique Deſcenſion alſo. Aſcenſionall difference, is onely the remainer, the one being ſubtracted or taken from the other.

The Golden number or Prime, is the time of 19. yéares: in which time the Sun and Moone make all varietie of their Coniunctions, Oppoſitions, and other Aſpects.

Epact, is the 11. dayes and 6. houres, which are added to the yéere of the Moone, beeing 354. dayes, to make it equall with the yéere of the Sunne, which conſiſteth of 365. dayes ¼. By

the

the Prime is found out the Epact: and by the Epact is found out the age of the Moone.

The Circle of the Sunne is the number of 28. becauſe that in 28. yeares all the varietie of Dominicall or Sunday Letters and Leape yeares are expired, being that at the 29. yeare the ſaid Circle doth begin againe: the vſe of the which number is to finde out the Dominicall Letter for any yeare paſt, preſent, or to come: Where note, that there is but 7. letters which ſerue for Sunday letters, viz. A B C D E F G. And albeit, that in the dayes of the weeke, they proceed according to their naturall order of the Alphabet, yet in the yeares they goe backward: As if G, be for one yeere, F, ſhall be for the next: and when it is Leape yeere (which is euery fourth yeere) then is there 2. Letters for the yeere, the firſt ſeruing from the firſt of January till S. Mathias day, which is then the 25. of February, and then the other letter takes place, and ſerues till the end of the yeere.

To find which number of the Sunnes circle, and conſequently the Dominicall letter for the yere propoſed to the yere of our Lord adde 9. that totall deuide by 28. and that which remaines, is The Circle of the Sunne for that yeere: Then to know the Dominicall letter: note that the 28. yeere the dominicall letter is A, and is the third from the leape yeere: therefore the firſt to begin withall againe, is GF, becauſe it is another leape yeere, and ſo counting the 7. letters backward, and euery fourth yeere counting 2. letters: that letter vpon which the number of the Sunnes circle ends, ſhall be the Sunday letter for the yeere propoſed.

As for Example.

The yeere 1627. adding 9. thereto, it makes 1636. that being deuided by 28. the remainer is 12. the circle of the Sunne: then counting 12. Letters backward according to order till I haue counted 12. places, beginning with GF, thus: 1. GF, 2. E, 3. D, &c. I find that the 12. place ends vpon G, which I conclude to bee the dominicall letter for the yeere aforeſaid: and it is the third yeere after leape yeere.

And here is to be noted that the Prime and Dominicall Letter, changes the firſt day of January, and the Epact the firſt day of March.

To

To finde out the Prime.

Diuide the yeare of our Lord by 19. and to that which remaineth after the diuision, adde one: the Product is the Prime number for all that yeare.

As for Example.

I would know the Prime for the yeare 1627. diuide 1627. by 19. and you shall haue in the Quotient 8. and after the diuision there, rests 12. vnto which if you adde 1. it makes 13. which is the Prime for that yeare 1627.

To finde out the Epact.

Adde to the Epact of the yeare past 11. and if it passe 30. take away 30. and the Product is the Epact for all that yeare: but otherwise, which is the better way: Imagine three places vpon your hand, which for example let it be the three ioynts of your fingers, and call or name the first ioynt 10. the second 20. the third 30. then count the Prime number vpon the 3. ioynts aforesaid, and going ouer them vntill you come to the end of the said Prime number, marke vpon which your Prime ends, and adding the number of the ioynt with the Prime, if they come not to 30. that shall be the Epact for all that yeare: If they passe 30. take away 30. and the remainer is the Epact, if it be just 30. then is the Epact equall to the Prime.

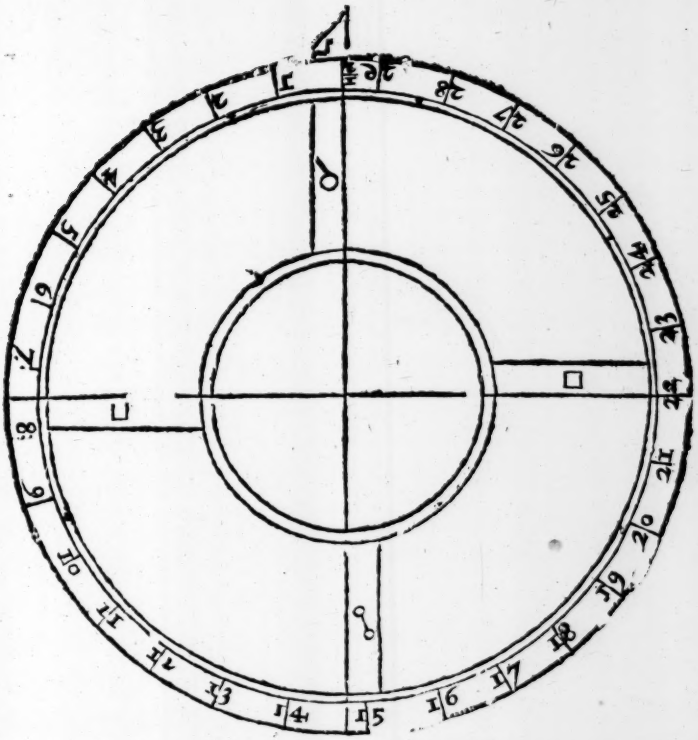
As for Example.

The yeare 1627. the Prime is 13. and imagining the first ioynt of my finger to be 10. the second 20. the third 30. I count vpon the 3. ioynts 13. the Prime number, viz. vpon the first ioynt I tell 1. on the second 2. on the third 3. Againe, on the first 4. the second 5. and so to 13. which is the Prime, ending vpon the first ioynt, which I call 10. therefore adding 10. the number of the first ioynt, makes 23. for the Epact of the yeare 1627. aforesaid.

To know the Moones age.

Adde to the day of the Moneth, the Epact, and so many dayes more as are Moneths from March to the Moneth you are in, including both Moneths, and if they come not to 30. so much is the Moones age: But if they passe 30. take away 30. and the ouerplus is the Moones age.

This



The 4. white quarters within the vtmoſt circle are to be cut out, and then the figure to be placed vpon the Compaſſe following.

1. *For the Sunnes Azimuth having no Declination.*

ADde the Complement of the *Latitude*, to the Complement of the *Almicanter*, which if the totall be more then a quadrant, ſubtract 90. and ſet downe the ſine of the remainer for the firſt number. Againe, adde the complement of the *Latitude* and the *Almicanter*, and adde the ſine thereof to the former: from the one halfe of that totall ſubtract your firſt number or ſine, and ſet downe the remainer. Then,

As the ½. of the 2. firſt numbers added is in proportion to the whole ſine, ſo is the ſaid remainer to the ſine of the Sunnes true *Azimuth*.

Example.

Latit. 51.d.30′. the Comple. 38.d.30′. } Added makes 108.d.30′. *Almicanter* 20.deg. Complem. 70. 0. } 90. ſubtracted, leaues 18.deg. 30′. whoſe ſine 3173. is the firſt number. Againe, complement of the *Latitude* 38.d.30′. *Almic.* 20.d. added makes 58.30′. whoſe ſine 8526. is the ſecond number, thoſe 2. numbers added makes 11699. the ½. thereof 5849. from which ſubtract 3173. the firſt number reſts 2676. for the remainer: then ſay,

As 5849. the ½. of the 2. firſt numbers is to 10000. the whole ſine, ſo is 2676. the remainer to the *Azimuth* deſired.

Facit, 4575. whoſe arch 27. deg. 14. min. is the *Azimuth* from the Eaſt Southward.

2. *When the Sunne hath North Declination, the 2. Complements being equall to a quadrant.*

ADde the complement of the *Latit.* with the *Almicanter* onely, and from ½. the ſine thereof, ſubtract the ſine of the Declination, and ſetting downe the remainer,

As the ½. aforeſaid, is to the whole ſine, ſo is the remainer aforeſaid to the ſine of the *Azimuth* deſired.

3. *When the Sunne hath North Declination, the 2. Complements leſſe then a quadrant.*

ADde the complement of the *Latit.* and the complement of the *Almicant.* ſetting downe the ſine of the complement thereof, then

then adde the *Almicanter* and the complement of the *Latitude*, and from the ſine thereof ſubtract the former, ſetting downe ½. of the remaine for the firſt found number: againe, ſubtract the ſine of the firſt Complement from the ſine of the Declination and the remaine thereof, againe ſubtract from your firſt found number, and ſet the remaine thereof downe from your ſecond number: and then,

As the firſt found is the whole ſine, ſo is the ſecond to the *Azimuth* deſired.

4. *When the Sunne hath North Declination, and the 2. Complements more then a quadrant.*

ADde the complement of the *Latitude*: and complement of the *Almicanter*, which being more then 90. ſubtract 90. and ſet downe the ſine of the remainer, then adde *Almicant.* and complement of the *Latit.* and ſet downe the ſine thereof, adde both the ſines together and take the ½. thereof for the firſt found number, then to the ſine of the firſt 2. complements adde the ſine of the Declination, and from that totall ſubtract the firſt found, and ſet downe the remainer for the ſecond found: and then,

As the firſt found is to the whole ſine, ſo is the ſecond found to the ſine of the *Azimuth* deſired.

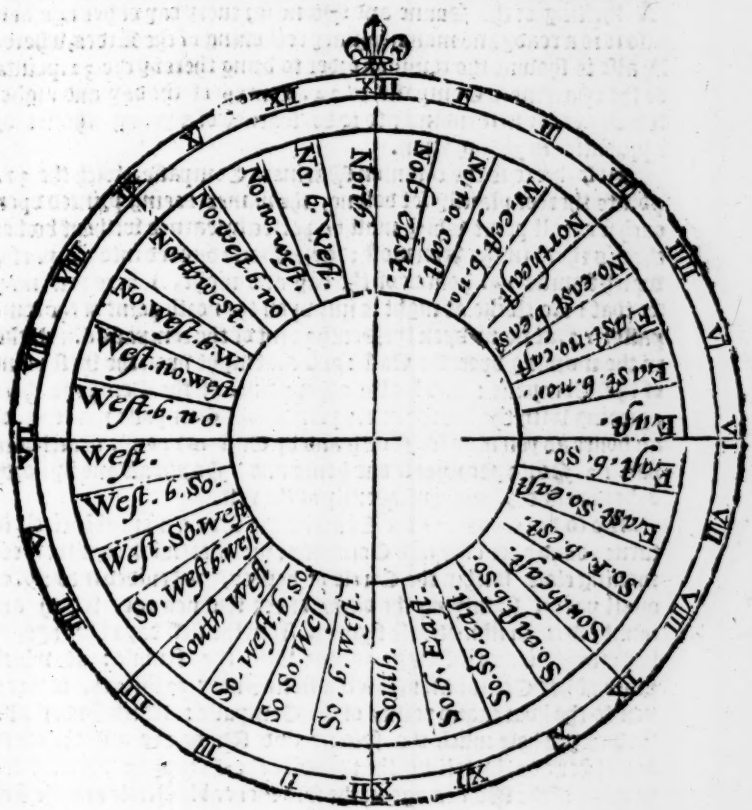
5. *When the Sunne hath South Declination, and the 2. Complements more then a quadrant.*

ADde the 2. Complements, ſubtract 90. ſet downe the ſine of the remainer, adde alſo the *Almicanter* and complement of *Lat.* adde both their ſines and ſet downe ½. of the totall for the firſt found, then ſubtract the ſine of the Declination from the ſine of the remaine of the firſt 2. Complements, and that remaine againe from the firſt found, which laſt remaine ſet downe and ſay,

As the firſt found is to the whole ſine, ſo is the ſecond found to the ſine of the *Azimuth* deſired.

Certaine

This is when the Moneth hath 31. dayes, but if the Moneth hath but 30. dayes, you muſt take away but 29. and the reſt is the age aforeſaid, for in thoſe Moneths that haue 31. dayes, the Conjunction is the 30. day of her age, and thoſe Moneths that haue but 30. dayes, the Conjunction is the 29. day of her age.



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A Declaration of the former Inſtrument.

THis Inſtrument gines you a plaine and eaſie order, for the ſhifting of the Sunne and Moone for euery day of her age; and alſo it is a ready and moſt neceſſary reckoning of the Tides, whereby alſo is ſhowne the common order to bring thereby the 32. points of the Marriners Compaſſe to 24. houres of the day and night, which are the firſt rudiments to be learned of a young ſcholler or apprentice in Nauigation.

Firſt, here is the common Mariners Compaſſe, with the 32. points thereof plainly ſet downe, the names beeing printed vpon each ſeuerall point, which muſt be perfectly learned without booke: then is there in the vttermoſt edge, a Circle diuided into 24. parts, which ſignifie 24. houres of the day and night, where you may ſee that 12. a clocke at night is iuſt vpon the north point of the compaſſe: 12. at noone vpon the South point of the compaſſe 6. a clocke in the morning vpon the Eaſt: and 6. at night vpon the weſt point of the Compaſſe: and for the other points of the Compaſſe their agreeing with the houres, euery point of the Compaſſe makes $\frac{1}{4}$. of an houre as you may ſee North and by Eaſt is vpon $\frac{1}{4}$. of an houre paſt 12. North Northeaſt one houre and $\frac{1}{4}$. Northeaſt and by north 2. houres and $\frac{1}{4}$. and conſequently of the reſt.

Alſo to the Center of the Compaſſe is fixed a moueable circle to turne round about the ſaid Compaſſe: the vttermoſt edge whereof mouing cloſe within the Circle of houres, is deuided into 29. equall parts, ſignifying the dayes of the Moones age, which are numbred in Arithmeticall figures, from the firſt day of her age, to her coniunction or meeting againe with the Sunne: at which place of her Coniunction, is left a little Inder or ſhewer, to direct you to the houres and points of the Compaſſe: which Inder alſo ſhewes you how much the Sunne and Moone are aſunder euery day of her age, by telling the points of the Compaſſe betwixt the number of the Moones age in the ſaid moueable Circle and the Inder thereof, accounting euery point for 11. degrées, and $\frac{1}{4}$. or other-

wiſe

wise the number of the houres contained in the vttermost Circle, betwixt the said number and the Moones age and the Inder, accounting euery houre for 15. deg. shewes the deg. of distance betwixt the Sunne and the Moone.

Now to keepe reckoning of the tydes thereby, you must know by the Table hereafter set for that purpose, how it flowes: that is to say, what Moone makes full Sea or high water at that place where you would know the time of the tide or high water for the day proposed: which knowne, you must also by the former propositions, or else by the Kalender following, know the Moones age: then seeking out the number of the moones age in the moueable Circle, place the said number of the Moones age vpon the point of the Compasse which makes full Sea, vpon the change day at your place desired, and staying it there, the Inder which is in the said mouable Circle, poynts you directly to the point of the Compasse that the Sun must be vpon, when it shall be high water the foresaid day in the desired place, and also, in the vttermost fixed Circle it shewes the houre of the day which you desire.

As for Example.

The first of January 1627. I desire all this aforesaid: First for the Moones age, because that the Epact changeth not till the 1. of March, I adde the Epact of the last yere, before which is 12. and the day of the Moneth 1. is 13. then January being the 11. Moneth from March, 11. added thereto, makes 24. for the Moones age the 1. of January 1627.

Againe, to know how much the Sunne and Moone are asunder, the Moone being 7. dayes old, I seeke in the moueable Circle for the Moones age, which being 7. I place 7. vpon a certaine point of the Compasse, which for example is here West, and the Inder shewes the North and by west, and $\frac{1}{4}$. to the Northward, which is 7. points and $\frac{1}{4}$. that multiplyed by 11. $\frac{1}{4}$. the number of degrees that belong to a point of the Compasse, makes 87. degrees 12. min. for the distance betwixt the Sunne and the Moone, and in houres it shewes 5. $\frac{1}{4}$. which multiplyed by 15. yeelds the like, being very neere $\frac{1}{4}$. of the Zodiacke.

Then for the Tides, at London Bridge it flowes Southwest, and

and Northeast, or is high water at 3. a clocke on the Change day: therefore when the Moone is 7. dayes old, I place the Moones age upon the point Southwest 3. a clocke, and laying the moueable rundle there, I see that the Inder shewes almost Northwest, which is 40. minutes nerest hand, or neere 3. quarters of an houre past 8. of the clocke, at which time it shall be high water at London-bridge, the Moone being 7. dayes old.

Againe, at Harwich where it flowes South and by East, the Moone 10. dayes old, I lay 10. (the Moones age) upon the point of the Compasse South and by East, and then the Inder shewes the point West Northwest of the Compasse, and the circle of houres $\frac{1}{2}$. of an houre past 6. which is the time of the full sea at Harwich, the Moone being 10. dayes old.

But if you want a Table or instrument to worke the account of the tides, you may doe it by memory, multiplying the Moones age by 4. and deuide the product by 5. and to the quotient adde for euery vnity which remaines vpon your diuision 12. min. that totall adde to the houre that it makes full Sea on vpon the Change day, the product shall be your desired number, as in the first Example.

The Moone 7. dayes old, and the high water at London on the Change day at 3. of the clocke, I multiply 7. (the Moones age) by 4. makes 28. that diuided by 5. the quotient is 5. and 3. remaines vpon the diuision, which 3. being so many times 12. min. makes 36. min. and added to 5. in the quotient, makes 5. houres 36. min. that added to 3. the houre of full sea vpon the Change day, makes 8. of the clocke and 36. min. as aforesaid.

The gouernment of the Planets.

DIuers Writers haue disagreed, concerning the Planetary houres, some making the houres of the Planets equall with the houres of the clockes, and so continuing their Regiment orderly with the other common houres. Some againe beginning the said Planetary houres at noone, some at midnight, and some againe at the Sun-rising: Which indeed for the time of the beginning of the account is the best, and for the difference of the equality and inequality betweene the Planetary houres, and the common houres of the clockes, Gemma Frisius agreeing with the best

Astro-

Astronomers, saith, that as the dayes and nights doe increase or decrease, so must the Planetary houres be longer or shorter accordingly, neuertheleſſe ſo that there ſhall be 24. Planetary houres in the Day and Night, as well as of other houres: but that if the day conſiſt of more then 12. houres, then proportionally the Planetary houres to conſiſt of more then 60. minutes: And if the day bee leſſe then 12. houres, then the planetary houres are to be leſſe then 60. minutes: and if the Day be juſt 12. houres, then the planetary houres are equall to the houres of the clockes, and not otherwiſe. The like is to be vnderſtood of the nights, and to make an equality of the Planetary houres to them of the Clockes, being that how long ſoeuer the Day is, yet there muſt bee but 12. Planetary houres: and how ſhort ſoeuer the day is, there muſt (neuertheleſſe) be 12. planetary houres, and ſo of the night: by which you ſee that the planetary houres are ſometimes greater and ſometimes leſſer then the common houres of the clockes, which alwayes conſiſt juſt of 60. minutes, therefore if you deuide the Day into 12. equall parts, one of thoſe parts ſhall be the quantity of a planetary houre, which you may doe thus: Multiply the houres of the day into minutes by 60. and if there be any odde minutes, adde them to the Product, the totall being deuided by 12. the quotient ſhewes the number of Minutes contained in an vnequall or planetary houre.

And againe, if at any houre of the Day or Night you know not what planetary houre it is, that is to ſay, how many Planets haue ruled ſince the beginning of the Day or Night propoſed: multiply the number of the houres paſt from Sunne-riſing by 60. and deuide the Product by the number of the minutes contained in an vnequall or Planetary houre, the Quotient will ſhew you how many houres and minutes of the Planets are paſt from the Sunne-riſing (if it bee in the Day) or from Sunne-ſetting, if it be in the Night: which knowne, enter the Table following, to know what Planet rules the day and houre propoſed, looking for the houre deſired in that Columne which is right vnder the Day propoſed: thoſe Planets which are gouernours of the ſaid houres in the Day time, being placed on that ſide next the left hand, and the gouernours of the Night on the right hand.

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Example

The 18. day of May being Sunday at 9. of the clocke in the morning, I would know what Planet rules? First in the following Kalender, I find that the 18. of May the day is 16. houres long, therefore I multiply 16. houres by 60. minutes, and the product is 960. that deuided by 12. brings in the quotient 80. minutes, for the length of a Planetarie houre at that time: then from 4 of the clocke (that time of the Sunne rising) till 9. a clocke, the houre proposed, is 5. houres, which multiplyed by 60. brings 300. that deuided by 80. (the length of a Planetary houre) brings in the quotient 3. houres and 3. quarters: so I conclude that at 9. of the clocke, 3. Planets haue past their Regiment, and the 4. hath ruled 3. quarters of his houre: therefore vnder the title Sunday in the top of the Table, I loke for 4 toward the foote of the said Table, against which on the left hand is placed Luna, therefore I say that the 18. of May being Sunday, at 9. of the clocke in the morning, Luna shall haue raigned 3. quarters of her houre.

Gouernours of the day.	Sunday,	Munday,	Tuesday,	VVednesday,	Thursday,	Friday,	Satterday,	Gouernours of the night
Sol.	1	12	9	0	10	0	11	Iupit.
Venus.	2	0	10	0	11	1	12	Mars,
Mercurie,	3	0	11	1	12	2	0	Sol,
Luna,	4	1	12	2	0	3	0	Ven.
Saturne,	5	2	0	3	0	4	1	Mer.
Iupiter,	6	3	0	4	1	5	2	Luna,
Mars,	7	4	1	5	2	6	3	Satur.
Sol,	8	5	2	6	3	7	4	Iupit.
Venus,	9	6	3	7	4	8	5	Mars,
Mercurie,	10	7	4	8	5	9	6	Sol.
Luna,	11	8	5	9	6	10	7	Ven.
Saturne,	12	9	6	10	7	11	8	Mer.
Iupiter.	0	10	7	11	8	12	9	Luna,
Mars.	0	11	8	12	9	0	10	Satur.

A Rutter, for the Courſes round about Ireland, from Cape to Cape, and what tides it makes in euery Harbour, and how many leagues it is from Harbour to Harbour.

IN primis, from Cape cleare to the Miſon-head is 7. leagues, and lyeth Weſt and by North, and Eaſt and by South, you ſhall find a Hauen Northweſt from Cape-cleare called Crooke Hauen, and it floweth there Eaſt Northeaſt, and Weſt Southweſt, you muſt goe Weſt to enter into it.

From the Miſon to the Durzib is 7. leagues, and lyeth Weſt Northweſt, and Eaſt Southeaſt.

Beare Hauen lyeth from the Miſon-head, North Northweſt 3. leagues and a halfe, you muſt goe Northweſt into the Hauen, it floweth Eaſt Northeaſt and Weſt ſouthweſt: if you will anker betweene the Durzib and the maine land, you muſt goe a boord the Iland, for the Eaſt ſide is not ſound.

The 3. Ilands that be off the poynt of the Dowrzles, which is called the Bull, the Cow and the Calfe, they be ſound, you may goe within them or elſe betweene them for there is no danger but what you ſee.

Dowrzles and Blaskey lye North and by Weſt, and South and by Eaſt, and there is betwixt them 12. leagues, the Skellocks is betweene both, and it floweth Northeaſt and Southweſt.

Northeaſt of great Skellocks, a 2. leagues off you ſhall find the entry of Valleas, you muſt runne Eaſt Southeaſt to enter in, it floweth Eaſt Northeaſt, you muſt borrow of the Iland to enter

in for the Point of the Caſter ſide is long.

North Northeaſt off the great Skellockes, 6. leagues off you ſhall finde the Hauen of the Ventry which is a good Road: It floweth Eaſt Northeaſt.

Northeaſt by North off the great Skellocks, 7. leagues, you ſhall find the Hauen of Dinggell, and without the Hauen is a rocke called the Croo, which is found on both ſides: The Rocke doth not couer but on a Spring-tide: You muſt runne Northweſt and by Weſt into the Hauen, it floweth Eaſt Northeaſt, and Weſt Southweſt.

The Ventry and the Sound of Begue, lyeth South by Eaſt, and North by Weſt 3. leagues, and when you are paſt into the ſound of Begue, you muſt lye Eaſt and by North into the roade againſt a red cliff which is on the South ſide.

Southeaſt off the Sound of Blaskey, a 6. leagues off, you ſhall finde a good harbour named Begue, which is to the Northeaſt off Valence: The ſayd Hauen hath two entries, but the Weſt ſide is the beſt: You muſt take great heede of a ſunke Rocke that is on the Ilands ſide, which you muſt leaue on your Larboord ſide going in, and it floweth Eaſt Northeaſt, and Weſt Southweſt.

You ſhall underſtand, that the ſaid Sound of Blaskey, lyeth Southeaſt and Northweſt, but you muſt take heede of a ſhoald that is on the Eaſt ſide athwart the Sezebras.

From Blaskey to Smerrick, is 3. leagues, and if you enter into the Hauen, you muſt goe Southweſt into it: It floweth Eaſt Northeaſt, and Weſt Southweſt.

There is a Hill to the Eaſtward off Smerrick, which is called Sinbrandon, goe from Smerrick Eaſt Northeaſt, and you ſhall goe with Lopus-head, which maketh entry of the Riuer of Limerie, on the North-ſide: there is from one to the other 10. leagues.

Smerrick and the head of the Kerry, lye Eaſt Northeaſt and Weſt Southweſt, 7. leagues aſunder, and there is within the Bay 3. Ilands called Salline.

From Lawpſhead to the Seatries, is 7. lea. they lye E.N.E. and W.S.W. and if you enter into the riuer, take heed of a ſhold halfe way betweene Lawpſhead and an Iland called Scatrick, which

you

you muſt leaue on the South ſide, and to the Eaſtward of that Iland is a good roade: It floweth Eaſt Northeaſt, and Weſt Southweſt.

From Scatticke to Quoine, is 5. leagues, you muſt goe Eaſt, and you ſhall finde two Ilands, they bée flat Ilands, goe you to the Northwards hard aboord them, and from thence runne Eaſt northeaſt, and you ſhall finde a Rocke called the Bieſſe, goe hard aboord the South ſide of the ſaid Rocke, called the Bieſſe. And when you are at the ſayd Rocke, you muſt row Southeaſt, and you ſhall finde another Rocke called the ſmall Bieſſe, then goe with the Iland of the entry of Darſey, and borrow aboord the Iland, as neere as you can, for feare of the banke going into the Hauen, and you muſt moore at the Eaſtie by foure Cables, for there goeth a great tide, it flowеth Eaſt northeaſt, and Weſt ſouthweſt.

The Sound of Blaskey, and the Ilands of Arrin, lye North northeaſt, and South ſouthweſt, and there is betweene them 16. leagues: the Ilands lye Eaſt and Weſt, and make the entrance of Galloway and the other Ilands: there is one which is naught, but the Weſt ſound is good, and the next ſound to it is good, which is called the little ſound, but the ſound comming from the Eaſt is naught, but the next comming to the Black-ſhore from the Eaſt is partly good, but you muſt put the two partitions to the Iland, for it is dangerous: You muſt vnderſtand that there is one Iland in the courſe way, betwixt Lampſhed and the entry of Galloway, that hath a great Kanie, a league and a halfe off the maine land.

If you goe before the Towne of Galloway, goe aboord the Black-ſhore, and bring the Black-ſhore Southeaſt of you: then goe Northeaſt, and you ſhall fetch the Iland called Morton Iland, and there is betweene them both 3. leagues: You muſt not truſt to the North ſhore, for there is a ſhold halfe way to the Black-ſhore, and the Iland of Morton, is thwart of two white points, which is on the North ſide.

The ſayd ſhold is vpon the Weſt ſouthweſt ſide of the ſayd Iland of Morton, a league & a halfe off at ſpring-tide, then ſhall you

ſee it dry, and it floweth at the ſayd Iland, Eaſt northeaſt and Weſt ſouthweſt.

The Sound of Saint Gregory, and the Rode of Galue, lyeth Eaſt northeaſt and Weſt ſouthweſt, and there is betwixt them 8. leagues.

The ſound of St. Gregory and Silvis-head, lye ſoutheaſt and northweſt, and the diſtance betwixt them is 9. leagues.

Slinſhed and Sarke, lye North by weſt, and are diſtant 15. leagues.

Blacke-rocke, is an Iland which is Weſt off Kill-head, a league off the Cape: the ſaid Blacke-rocke and the Stags, lyeth Northeaſt and by north, and are diſtant 12. leagues.

From the ſaid Blacke-rocke, runne North, and you ſhall find the Iland of Eaſt Eues, and there is betweene them 12. leagues.

South ſouthweſt off the Stags, there is a Hauen called Broad-hauen, from the Hauen to the Stagges is two leagues: the Stags is a Cape that maketh the entry of the Riuer of Raſken, they lye Eaſt and weſt, and are diſtant 8. leagues: the Stagges and the Cape of Tellen, lye Northeaſt and ſouthweſt, and are diſtant 15. leagues.

Betwixt the Stags and the Cape of Tellen, in the Bay, is the Hauen of Moy, the Hauen of Portway, the Hauen of Slego, the Hauen of Ballecſheanen, the Hauen of Dongall, the Hauen of Kellekeg, and the Hauen of Tellen.

The Cape of Tellen, and the Iland of Arron, lye North northeaſt, and Southſouthweſt, and are diſtant 7. leagues.

The Iland of Raghlenburne and Tellen, lye Southweſt and Northeaſt, and are diſtant two leagues.

The Iland of Raghlenburne, and the Iland of Torre, lye North northeaſt and South ſouthweſt, and are diſtant 14. leagues.

To the Eaſtward of Torre, is a Cape called Horne-head, and are diſtant 2. leagues: Southeaſt of Horne-head is a Hauen called Sheepe-hauen, it floweth Eaſt and weſt, but you ſhall haue in the Way a good roade for all winds: thoſe Hauen is a broad Hauen, and is two leagues from the Cape.

Horne-

Horne-head and the entry of Loughfoyle, lye East Northeast, and West Southwest, and are distant 6. leagues.

The entrie of Loughfoyle, and the Iland of Enersterhoulde, lyeth Northeast and Southwest, and are distant fiue leagues.

The Iland of Torre, and the Iland of Enersterholde, lyeth East and by North, and West and by South, and are distant 9. Leagues.

The entrie of Loughfoyle, and Enersterholde, Southeast and Northwest, and are distant fiue leagues.

The Iles of Enersterhoulde, and Skirris Portrush, lye East Southeast, and West Northwest, and are distant 10. leagues.

You must vnderstand that the Riuer of Loughfoyle lyeth from Skerris Portrush, West Southwest, and East Northeast, and there is betwixt them, the Riuer of the Band: there is betwéene Portrush and Loughfoyle, 5. leagues: There is in the entry of Loughfoyle, a land which is called the Tonnes, which is dangerous for any Ship of charge, also there is a channell of the East side of the Tonnes, hard aboard the shore, but you must haue your tide: It floweth East by South, and West by North: Skerris Portrush and it lyeth South and North, and are distant 12. leagues.

Skerris Portrush, and the Ilands of Raghlins, lye Northeast and by East, and Southwest by West, and are distant 5. leagues: it floweth in Skerris East Southeast, and West Northwest, the flood commeth from the Eastward.

Off the Raghlins is a Cape called the faire Forland, and betwixt them is a league and a halfe, the faire Forland and the Knee lyeth South Southeast, and North Northwest, and are distant 9. leagues.

The faire Forland and Loughrian in Scotland, lye East Southeast, and West Northwest, and are distant 15. leagues.

There is betwixt the Knee and Carickuergus, 5. leagues.

The point of Loughrian, and the Ilands of Commoras, off Scotland lye North and South, you must passe by Elliso, and by the Hauen of Lambach a sunder 7. leagues.

The point of Lougbrian and Copnam Iles, lyeth Northeast, and Southwest.

The Knee and the Rocke of the Maydens, lye Northeast by North.

The Knee and Ellie in Scotland, lye Northeast by East, distant 10. leagues.

Loughrian in Scotland, and the mould of Galue, lyeth South Southeast, and North northwest, and are distant 7. leagues.

The mould of Galue, and the Calfe of Man, lye South southeast, and North northwest, and are distant 10. leagues.

The Compnam Iles, and the roade Carricke Vergus lye East and west, and are distant 14. leagues, & lieweth in the sounn East southeast, and West northwest.

Compnam Iles and the point of the Moulens, lye South southeast, and North northwest, and are distant 7. leagues.

The point of the Moulens and the Ile of Lambay, lye South southwest, and North northeast, and are distant 21. leagues.

Lambay and Catlingford, lye North northwest, and South southeast, and are distant 18. leagues.

Lambay and the Ile of Dalke, lye South southwest, and North northeast, and are distant 5. leagues.

The banke of Wicio, beginneth thwart of the Forth of Dublin, and containe to the Ile of Tosker, they lye North by West, and South by East, and they lye in length 24. leagues.

Tosker and the point of the Grenord, lye East and by North, and West and by South, distant 2. leagues.

And when you are bound to the Eastward aff the Grenord, you must kepe the Mountaine of Walsford aboue the low land, and so you shall goe clére off all the dangers betwixt you and the shore: And if you close the Mount with the low land, then you shall goe with the dangers.

Tosker and the Cape of Canwall, lye South by East, and North by West 40. leagues.

Tosker and the Salts, lye East northeast, and West southwest, distant 6. leagues.

The Salts and Silly, lye South and North, and are distant

three

thzée and thirty leagues.

The Salts and the Tower of Waterford, lye East and West, distant 5. leagues.

The Tower of Waterford and the Ile of Ballecutin, lye Southwest and by West, and Northeast by East, but betweene the Tower of Waterford and Ballecutin, is a Hauen called Yoghall, and a Sea-bord it, is an Iland called Capell Ile, and betweene Capell Iland and Ballecutin, is 4. leagues.

The Tower of Waterford and Helwick-head, lyeth East and West, distant 3. leagues.

Capell Iland and the Iland of Ballecutin, lye West southwest, and East northeast, and are distant 3. leagues and a halfe.

Ballecutin and Corke Hauen, lye West by South, and East by North, and are distant 3. leagues and a halfe.

Oyster Hauen and the Old head of Kinsale, lye Southwest and Northeast, distant 3. leagues and a halfe.

The Hauen of Kinsale lyeth from the Old-head, North northeast, and going in, you must keepe Bane Castle, open off the West land.

The Old-head and Cape Cleare, lye West by South, and East by North, and are distant 14. leagues.

Cape Cleare and Silly, lye East southeast, and West northwest, distant 50. leagues.

There lyeth from Fasten a Hauen called Crocke Hauen, and is from it Northwest, distant 4. leagues.

There is a Hauen called Scoll Hauen, which lyeth from Fasten Northand by West, distant 5. leagues.

There is a headland, halfe way betwixt the Old-head of Kinsale and Balecmore, which is called Kendonetedo, and it lyeth Northwest by West, from it is a good Hauen called Clender. there is a high Land to the Eastward, you must goe aboth that high land, and so into the Hauen. There is a raule of Rockes on the West land, that goeth to the Eastwards, therefore keepe the East syde, and when you come in, Anker before the Castle: there lyeth West northwest from the sayd head, a good Hauen, called Castle-hauen, 4. leagues from it, and if you come out into the Sea

and

and meete with the Staggs, you muſt goe Northeaſt into Caſtle-haven, and in the entry there is an Iland which you muſt leaue on the Eaſt ſide of you, and another flat Iland which you muſt leaue on the Weſt ſide of you: you may goe dry at low water from it to the maine, for it is very nigh to the Weſt land, but be bold on the Eaſter Iland, and goe right with a Chappell that lyeth on the Eaſt ſide of the maine Land, and when you are thwart of the Chappell, you ſhall ſee a Caſtle of the Weſt ſide, and thwart of the Caſtle you may enter in 12. fatham, it is from the Staggs three and a halfe leagues.

You muſt vnderſtand, that the flud ſhots from Dourze to the Old head of Kinſale North northeaſt, and the ebbe to the contrary, and from the Old head to the Tower of VVaterford, North-eaſt and Southweſt, and from the Dourze to the northwards, North northeaſt and South ſouthweſt.

If you will goe in betwixt the Caſh and the North-head of the grounds into Daiky, you muſt bring a round hill that ſtands like a ſugar-loafe North northweſt, and then you ſhall haue 10. fatham: It floweth Southeaſt alongſt the Channell and the barre of Poulbacke, there is eight foote water vpon it at low water, and three fatham at full ſea: your Barre lyeth South and North, and you ſhall haue in the roade of Poulbacke, 14. foote at low water.

To ſayle from Daiky to the Roade of Poulbacke, you muſt keepe a ſmall Rocke open, a hand ſpicke length, and when you come to the Barre, you muſt lye Weſt ſouthweſt vp into the roade within the Beacon, then muſt you Anchor in 7. foure fatham at high water, for there be two hilles on the Southſide, a high hill and a low round hill: bring them both in one, and then you be in the beſt of the Roade. A South ſoutheaſt Moone, makes a full ſea.

A Note

☞ A Note for going into *Milford*.

If you come for Milford, you muſt leaue all the Ilands to the Weſtwards, and when you leaue for Graſham Northy Northweſt, then the Hauen beareth Northeaſt by North, and when you come into Dall Rode, you may ride in three fatham and a halfe at low water, it flowath East by North.

Milford goeth in cloſe vnder Cowein and Scaban, to the Eaſtward, and when you come open of Milford, you ſhall ſee an Iland like the Mawſtone, which lyeth on the Eaſt ſide, and in Dall Rode you may ride for all winds, the Small lyeth from the Graſham three leagues, and betwixt them lyeth a ledge of Rockes, which is dry at low water: it lyeth midway, it is very dangerous comming betweene them.

A Gene-

A Generall and Compendious Tide-table, shewing what Moone makes full Sea or high Water, in all these places following.

Full Sea on the Coasts of *Zutphen*, *Friezland* *Holland*, *Zealand*, and *Norway*.

At the Yutlandish Iles before the Riuers of Heuer, Eider and Elue, S. and N.
At Ancuisen, S. and N.
The Ile of Vrke before Delfe Ile, at Emden, and all the shores of Flanders, S. and N.
Before the Maers deepe. E. and W.
At Hambrow and Antwerp, E. and VV.
Underneth Holyland, W. S. W.
At Egmount and Harlem, S. E.
In the Bresond and Vourd, VV. S. VV.
Before the Easterne and Westerne entrances of the Emes or Riuer of Emden, before all the Coast of Friezland, and the Flye. E. S. E.
Before the Ghost of Texell, VV. S. VV.
Upon the Flats of west Friezland, Wyering, and Amsterdam, S. VV.
Without the bankes of Flanders, S. VV.
Dodrecht and Ziericke Sea, S. VV.
Roterdam, and from Harlem to the Riuer of Maes, S. W.
At VVard-house, E. and VV.
At Brihac, E. S. E.
Cape Gallant, S. by E.
The Hauens of Yotland and Norway, S. and N.
At Corpus Christi point, S. S. VV.
Before the Een in the channell at Horn, Edam, Ile of Gore, before the Maes, before Canfer and Teruer, S. S. VV.
Before the Willing and all the Coast of Zealand, S. S. VV.
North Cape and Blangbrow, S. VV.
Foxe-nose, and Saint Nicolas roade, VV. S. VV.

Full

Full Sea on the Coaſt of *France*, *Spaine*, and *Portugall*.

AT Blackneſſe, Armuy, Rammekins, and Camfer, S.S.VV.
Within the Foſſe of Cane, S.S.E.
Calice road and Diepe, S.S.E.
At Boleine, Calice, Graueling, & Dunkerk, halfe tide, S.& N.
The Iland of Baſſe, S.E.
Within the Seine, before the Caſquets, before Garneſey, S.E.
Before Cherborough, and the Raſe of Blanquet, S.& N.
At Newport halfe tide, S.& N.
At Seine head, S.S.W.
At Garneſey, and before Saint Poul, VV.b.S.
Belliſle & Holy-Ile, S.W.b.S.
Without Vſhant, and before Burdeaux, E.& VV.
Brittaine, Penmarke, Poytou, and Gaſcoine, S.VV.
Raſe of Fountnes, S.VV.b.W.
Bloy, & S. Mathewes, W.S.w.
Abrowarth, and St. Malowes, VV.b.S.
Before the Killiats, S.VV.
Portuiſe and before the Riuer of Burdeaux, S.VV.
From the Raſe to the Polehead, S.VV.
Before the Riuer of Nauntes, and before the Bay, S.W.
In the Bay within Vſhant, VV.S.VV.
At the Sept Iles, and at Calice in the Créke, VV.S.VV.
Within the Riuer of Roan, and from the Polehead of Burdeaux to the Forland of Fountaines, before Brouage, in the Riuer within all the Hauens aforeſaid, it floweth, S.VV.b.VV.
At S. Iohn de Luze, S.S.E.
At Concalo, and Saint Male, E.& VV.
At Cape S. Maries, S.E.b.E.
On all the Coaſt of Biskay, Galizia, Portugall, & Spaine, it floweth Southweſt and Northeaſt.

Scotland.

IN S. Magnes ſound, S.E.b.E
At Faires Iles, S.E.
In the Frith, S.S.E.
Faire Ile Rodes, S.b.E.
At Orkney, S.E.

England.

AT Barwick it flowes, S.s.w
At the Staples halfe tide, N.E.b.E.
At Howacliffe ſote, halfe tide, N.E.b.E.
At

At Flambrow-head quarter tide E.N.E
At the Shoo, S. and N.
At Tinmouth quarter tide, S.W.
At the Spore, W.b.S.
Newcastle and Humber, W.b.S.
Winterton, E.S.E.
Blacke rayle, and the Nowre, S.b.W.
Blackney & the Shields E. & W.
Yarmouth, S.E.b E.
Orford and Albrow S.E.b.S.
Whitbay and Robin-hoods bay S.W.
Before Hartlepole. S.W.
Scarbrow quarter tide, W.S.W.
Hull and Lin halfe tide, E. & W.
Before Humbers mouth, N.W.
At Burnham quarter tide, E. and W.
Cromer, S.E.
At Liestow quart. tide, S.S.E.
Harwich and Douer, S.S.E.
Harwich within, S.b.E.
South Forland, S.S.E.
Before Margate and Thames mouth, S.b.E.
Leigh and Kentish knock, S. & N.
Spits and along the Swine, S. and N.
Betweene Tinmouth and Flambrow-head, S.W.
Betweene Flambrow-head and Bridlinton bay, S.W.b.W.
Betweene Bridlington & Lawrenas, W.S.W.
Betweene Lawrenas and Cromer along the Well, halfe tide, E. and W.
Betweene Cromer & Yarmouth roade, S.E.
Betweene Laistow roade and Orfordneſſe, S.E.b.E.
Betweene Orford and Orwell wanes, S.S.E.
Betweene the Naze and the Warre-head of Colue, S.b.E.
At the west end of the Nore, S.b.W.
Rochester and Maldon, S.b.W.
At Grauesend S.S.W.
London and the middest of the Heades or straights, S.W.
At the north Forlands, S.S.E.
At Beachy, S. and N.
Seuen Cliffes, S.E.
In the Downes, S.S.E.
In the Chamber and at Gore-end S.b.E.
At Cambernes & at the Needles S.E.b.S.
In Cambernes roade, S.S.E.
Portsmouth, Hampton and the Ile of Wight, S. and N.
In the Offing from the North Forland to the South Forland, it runneth halfe tide, and from the South Forland to the Nasse it runneth halfe tide, and halfe quarter tide, and

and from the Naſſe to Fairly halfe tide, and from Fairly to Beachy quarter tide vnder other.

At Portland roade, E.S.E.
At S. Ellens, S.E b.E.
Within the Race of Portland, At Poole in the Hauen, at Home-head, and thwart of Plimouth and Dartmouth. S.E.
At Waymouth, E. and W.
At Famouth, Foy, Fortune, Plimouth & Dartmouth, W.b.S.
Briſtow and Foulnes, E.b.S.
At the Start E.b.S.
Moſhole, W.S.W.
S. Dauids head, E. and W.
Milford-hauen E.S.E.
Ile of Man and Catnes, S.E.
Three leagues off the ſhore, at the Lizard to the ſhore, and to the Lands-end. E.S.E.
Within Torbay and in the bay of Carnaruen, W.b.S.
At the mouth of Seuern, W.b.S.
At the Moonles, W.b.S.
From the Lizard to the Sorlings, W.b.S.
Before Silly in the Channell, E. and W.
At Silly halfe tide, S.S.W.
Within Mounts Bay, and in the Sea of Wales and Seuerne, W.S.W.
At Lundy and the Holmes of Briſtow, E. and W.
In the Sleeue betweene Silly and Vſhant, S. and N.
Note that the Floud ſets in at the Eaſt end of Wight till a Southeaſt Mone: in the roade of Dungeneſſe South Southeaſt, but without in the Channell a Southweſt Mone full Sea: from the Seames, and in the broad ſound betweene it and Vſhant, the Floud runneth Eaſt Northeaſt, and Weſt Southweſt.

Ireland.

AT Caldy, W.b.S.
Waterford and Abermoricke, E. and VV.
At Cape-cleare, E.S.E.
Macknels Caſtle, S E.b.E.
Dublin and Lambay, S.E.b.E.
Dunbar and Kildien, S.E.
Dungarum, Kinſale, Corke Hauen and Baltemore, VV.S.VV.

The Course of all the Coasts of *Holland*, *Zeland*, *France*, and *Spaine*, vpon what Point, and in what distance they are.

From the Ile of Texell vnto Egmont, S. and b. W. leag. 5.
From Egmont vnto the Maze, S. S. W. l. 11.
From the Maze vnto the Wieling, S. W. l. 12.
From the Wieling vnto the head or straight betweene Douer and Calice, W. S. W. l. 18.
From the Ile of Walkeren or Flushing vnto Calice, S. VV. & b. VV. l. 22.
From Blackneſſe vnto Deepe, S. S. W. l. 18.
From Deepe vnto Seyn-head, or the Riuer of Seyne, W. S. W. l. 11
From Seyne-head to the Riuer of Cane, S. VV. l. 8.
From thence vnto Cape de la Hague. N. VV. l. 12.
From thence vnto the Caskets, W. & b. N. l. 8.
From the Caskets to Garneſey, S. W. & b. W. l. 4.
From Garneſey to S. Malo, S. S. E. l. 10.
From Garneſey to the Sept Iles, S. VV. & b. S. l. 12.
From the ſeuen Iles to S. Poul, VV. S. W. l. 8.
From thence to the Fourne, VV. S. W. l. 10.
From the Caskets to the Fourne, S. VV. & b. W. l. 34.
From the Fourne to St. Mathewes point, S. S. E. l. 3.
From thence to Fontenau, or Fonteynes, S. & b. E. l. 5.
From Vſhant vnto the Seames, Seabord it, S. l. 7.
From Fontenau to the Weſt Penmarques, S. E. l. 7.
From thence vnto the Ile of Croy, E. & b. S. l. 12.
From the Weſt Penmarques, to Bel-Ile, E. S. E. l. 15.
From thence to Heys ſomewhat more Eaſterly, S. E. l. 12.
From thence againe vntill within Piquilier, E. & b. S. l. 10.
From thence againe vnto Croyſill, by E. & S. l. 9.
From Piquilier vnto Heys, S. & b. W. l. 5.
From Heys to the Killiart, E. S. E. l. 10.
From the Ile of Heys to Porthuis, S. E. & b. E. l. 12.

From

From S. Martins Iland to the burning Ile,	S.E.& b.E.l.3.
From the Burning Ile to the Oyster banke,	S.S.E.l.3.
From S. Martins Ile to the Tower of Cordam,	S.& b.E.l.12.
From thence vnto Bayone,	S.& N.l.28.
From Bayone to Orlo,	W.S.W.l.5.
From Orio vnto S. Iohn de Luz,	E.S.E.l.6.
From Orio vnto S. Andrew,	W.& b.S.l.20.
From S. Andrew to Cape de Pennas,	E.& W.l.30.
From Cape de Pennas to Ribadeo,	S.W.& b.W.l.12.
From Cape de Pennas to Ortegall,	W.& b.W.l.20.
From Ortegall vnto Ribadeo,	E.l.14.
From Ortegall vnto the Ile of Cizaega,	S.W.& b.W.l.13.
From Cizaega vnto Coronna,	E.S.E.l.6.
From thence vnto Cape Coriana,	W.S.W.l.10.
From Coriana to Cape Finisterre,	S & N.l.3.
From Finisterre vnto Bayone,	S.E & b.S.l.14.
From Bayone vnto Port de Port,	S.S.E.l.18.
From Port de Port to Aueiro,	S. & N.l.8.
From Aueiro to Montega,	S.S.W.l.5.
From Montega vnto Barlings,	S.W.l.12.
From Barlings vnto Roxende,	S. & b.E.l.12.
From Roxende to S. Vlues point,	S.E. & b.S.l.8.
From thence vnto Cape of S. Vincent,	S. & N.l.24.
From thence vnto Pharo,	E. & W.l.14.
From Pharo vnto Lepe,	N.E. & b.E.l.12.
From Pharo vnto Saltees,	E.N.E.l.18.
From Saltees to Chipiona,	S.E.l.8.
From Chipiona to Calis Malis,	S.E.l.6.
From Calis vnto the Straight of Gibralter,	S.E.l.8.
From Calis vnto Cape de Cantin,	S.W. & b.S.l.60.
From Cape de Cantin, to the Ile of Madera,	VV.l.140.
From Cape S. Vincent to Madera,	S.W.& b.W.l.115.
From Roxende to Madera,	S.W.l.130.
From Roxende to the Ile of Tercera,	W.l.210.

The Courses of *England*, *Freland*, and *Scotland*.

From Boecknes vnto Leeth in Scotland, S.S.W.l.28.
From Leeth vnto Barwicke, S.S.E.l.8.
From Barwicke vnto the Holy Ile, E.S.E.l.4.
From S. Abbes-head to the Casterne end of Farne Iles, S.E.l.6.
From the Iles of Farne to the Tees mouth, S.S.E.l.14.
From the Riuer of Tees to Flambrow-head. S.E.& b.S.l.14.
From Flambrow-head to Blackney, S.E.l.18.
From Blackney vnto Winterton, S.E.l.8.
From VVinterton vnto Lestoff, S.& b.E.l.8.
From Lestoff vnto Orford Hauen, S.l.7.
From Orford vnto the Foreland, S.S.E.l.13.
From the Foreland to Douer, S.l.7.
From Douer to the Shingles, or the Nesse point, S.W.& b.W.l.7.
From the Nesse point vnto the Beache, W.S.W.l.10.
From the Beache to the Ile of VVight, W.& b.S.l.15.
From VVight vnto Portland, W.& b.S.l.10.
From Portland vnto the Start point, W.S.W.l.14.
From the Start vnto Ramhead point, W.N.W.l.6.
From Ramhead vnto the Dodmans point, VV.S.W.l.8.
From Dodmans to the Lizard point, S.W.& b.W.l.6.
From the Lizard to the Iles of Silly, VV.l.12.
From the Lizard to the Lands-end, VV.N.W.l.8.
From the Lands-end to the Ile of Lundy, N.E.l.14.
From thence vnto the Holmes of Bristow. N.E.& b.E.l.16.
From thence vnto the Ile of Caldie, VV.S.W.l.25.
From thence to the Iles of Salteys, on the Coasts of Ireland, VV.N.W.l.20.
From Salteys to Cape-Cleere, VV.S.W.l.25.
From Cape-Cleere to the Ile of Dorsey, VV.l.12.
From the point of Dorsey to the Ile of Blakem, N.N.W.l.16.
From Blakem vnto the Iles of Arrant, N.N.E.l.14.
From the Iles of Arrant to Galwicke, or the Galfe in Ireland, E.N.E.l.6.

Of

Of diuers and sundry Courses ouer the Westerne Sea.

From the Texell on the Coast of Holland to Flamborow, W.N.W.l.45.
From Texell vnto Winterton in Norfolke, V V.l.32.
From the Ile of Texell vnto Lestoffe, VV.& b.S.l.28.
From the Riuer of the Maze in South Holland, vnto Harwich, VV.l.26.
From the said Maze to the Foreland of England, VV.& b.S.l.25.
From the Marsdeepe in North Holland, to the said Foreland, S.VV.l.36.
From the said Marsdeepe to Calice, W.& b.S.l.38.
From Douer vnto Boloigne, S.E.l.8.
From Boloigne vnto the Beache, W.l.16.
From the Beache to Diepe in Normandy, S.E.l.18.
From Diepe vnto the Ile of Wight, E.S.E.l.28.
From Wight to the Seyne-head or mouth, S.l.10.
From the said Riuer of Seyne to Portland, W.N.W.l.30.
From the Ile of Wight vnto the Caskets, S.W.& b.S.l.14.
From Garnesey vnto S. Malo in Normandy, S.S.E.l.8.
From the Caskets to Portland, N.b.W.l.10.
From the Caskets to the Start point, W.N.W.l.16.
From the Start to the Sept-Iles in Normandy, S.S.E.l.24.
From the Start to S. Poul in Normandy, S.& b.W.l.22.
From S. Poul to Portland, N.E.& b.N.l.32.
From the Fournes to Ram-head, N.N E.l.28.
From the Start point vnto Vshant, S.W.& b.S.l.32.
From the Fournes to the Lizard, S.& N.l.22.
From Vshant to the Iles of Silly, N.N.W.l.26.
From the Sorlings to Milford Hauen, N.& b.E.l.25.
From the Sorlings to Wexford in Ireland, N.N.W.l.34.
From the Sorlings to Cape-Cleere, N.W.l.24.
From Cape-Cleere to Cape de Finisterre, S.E.N.W.l.130.
From the Lizard to Cape de Finisterre in Galicia, S.S.W.l.112.

From Vshant vnto the Ile of Cizarga in Galizia, S.S.W.l.58.
From Vshant to Laredo in Biscay, S.S.E.l.58.
From the Seame Rockes to St. Sebastian in Biscay, Southeast & by S.l.10.
From Vshant againe to Cape de Pannas in Biscay, S.& N.l.70.
From Belile vnto Ortegall in Galizia, S.W.l.75.
From S. Martins Ile to Ortegal, VV.S.W.l.85.
From Ortegal to Cape de Coriana, S.W.& b.W.l.24.
From Cape de Finisterre to the Iles S. Michael, VV.S.w.l.185.
From S. Michael to the Ile of Tercera, N.W.l.26.
From Cape de Finisterre to the Ile of Madera, Southwest, & by W.l.190.
From Madera vnto the great Ile of Canary. S.E.b.E.l.60.
From Cape de Finisterre to Bayone in Galizia. S.& b.E.l.15.
From Cape de Finisterre to the Ile of Barlings, S.& N.l.50.
From the Barlings in Portugal to the Ile Canary. S.S.W.l.170.
From the Ile of Madera to Calis malis, E.N.E.l.150.
From Calis to Cape de Cantin, S.W.& b.S.l.65.
From Cape de S. Vincent vnto Cape Cantin. S.& N.l.62.
From Cape de S. Vincent vnto the Ile of Madera, Southwest. & b.W.l.120.
From Roxen in Portugal to the Ile of Tercera. E.& W.l.210.

The Courses of *Norway, Swethland,* and East *Finland.*

From Schuytenes to the Vesteen, S.& b.E.l.4.
From Vesteen or Wostone to the Iedder, S.S.E.l.4.
From the Iedder to the Worsteen or Forstone, S.E.l.5.
From the Forstone to the Noes, E.S.E.l.6.
From the Noes vnto Reperwicke, E.N.E.l.8.
From Reperwicke to Mardon, N.E.l.10.
From Mardon vnto Iofferland, N.E.l.8.
From Iofferland to Langhesondt, N.N.E.l.2.
From Langhesondt to Ferderoer, N.E.& b.E.l.6.

From

From Ferderoer vnto Soen water,	N.l.6.
From Ferderoer vnto Roeghe,	N.N.E.l.4.
From Ferderoer vnto Akerſond,	E.N.E.l.6.
From Akerſond to Maeſterland,	S.E.&.b.E.l.4
From Pater noſter to Nydrinke,	S.E.l.8.
From Nydrinke to Waerberghe,	S.E.&.b.E.l.4.
From Waerberghe to Swedoroer,	S.S.E.l.6.
From Swedoroer vnto Col,	S.S.W.l.3.
From Col vnto Lapſand,	S.E.l.3.
From Lapſand vnto Ween,	S.S.E.l.2.
From Ween to Drakeriffe,	S.&.b.E.l.7.
From Drakeriffe to Steden,	S.&.b.W.l.4.
From Steden to the Noꝛth end of Bornholme,	E.&.b.N.l.15.
From Bornholme vnto Anno,	N.&.b.W.l.8.
From Anno vnto the Rockes,	N.E.l.8.
From the Rockes vntill within the Calmerſond,	N.N.E.l.10.
From Calmerſond to the Sweediſh Ionckfrow,	N.N.E.l.8.
From Ionckfrow to Landſoort,	N.N.E.l.8.
From thence vntill beſoꝛe Dury-hauen,	N.E.&.b.E.l.8.
From the Stockholmes Shares to View of Abo,	N.E.&.b.N.l.24.
From View vnto Luns Vtſchares,	E.N.E.l.28.
From the Vtſchares to the Ile Putſuagto,	E.&.b.N.l.30.
From thence vnto Somere,	E.&.W.l.9.
From Somere to the Rod-hole of Wiburgh,	N.E.l.9.
From the Rep-hole to Traelſand,	N.E.&.b.N.l.2.
From thence vnto Wiburgh,	leagues.2.

The Depth and Soundings, neere diuers Prouinces. And firſt, of Gaſcoigne, *Poictou*, and *Britaine*.

VVIthout the Riuer of Burdeaux, there is 14. Fatham depth, but when you come within the ſight of Cordan Tower, 30. fatham.

Ouer againſt the Coaſt of Poictou, 16. leagues without Oleron, you haue 36. fatham, but comming nére the land 8 leagues from the ſhore, you haue 35. fatham: In the Channell betwéene Porthuis and Heys, it is 30. fatham, and as much in the Channell of Heys: as alſo betwéene Heys and Belile, without the channell is 35. fatham, but within 25. without Heys, two kennings off, there is a ſound 45. fatham.

Twenty two leagues Southward off Belile, is 70. Fatham, but 9. leagues from the Northweſt point of that Iland; towards the Southweſt is 60. fatham: and ouer againſt the midſt of Belile, in 40. fatham depth, you ſhall ſée Land. In your courſe betwéene Belile and the Seames, you may come no nérer then 50. or 45. fatham, if you ſayle from Belile Weſt and by North: when you are againſt Gloyland, you ſhall finde 60. fatham depth, without and within the Rocke, which ſtands off Gloyland to the Seawards, you haue 40. fatham water: in 60. fatham depth without the weſt Penmarkes, you may ſayle Northweſt by Weſt without the Seames, but by night come no nérer then in 55. fatham, for the ground is groſſe and red ſand full of red Flints: halfe a league Weſt ſouthweſt off the Seames, is a ledge of Rockes, where you haue 7. fatham depth, but betwéene the Seames and the Rocke is 50. fatham.

In the Channell betwéene the Seames and Vſhant, is 55. fatham depth, the ground is groſſe and red ſand, with little round ſtones red and blacke: nére to Vſhant is 45. fatham, but within it is of a variable depth: Southweſt almoſt 6. leagues off Vſhant,

you

you haue 70. Fatham, and the ground is fine white ſand, with little white ſhelles, and other ſmall things like nédles, and then is Vſhant Eaſt from you: but if the ſand be groſſe and white, mingled with great and white ſhelles, then it is Southeaſt to you: but if you doubt of theſe grounds, goe Northerly, if your ſounde be déepe, then are you towards the Seames. but if not ſo déepe, then are you in the Channell almoſt North off Vſhant.

Betwéene Vſhant and Obueracke, in the trade, it is 60. fatham depth: betwéene Vſhant and the Sorlings in the middeſt of the Channell there is 70. fatham: betwéene the Seames and Vſhant in 70. fatham water, the ground is of little blacke ſtones eaſie to be broken and of yellow earth and clay: but if you finde red and hard ſand, goe Northward till you happen on white ſand mingled with long ſtroakes, and then you are in the Channell.

If from Cizarga you ſayle North northeaſt, in the Spaniſh ſeas toward Vſhant, and finde your ſelfe in 80. fatham, you are 14. or 15. leagues off Vſhant, but comming nérer, you ſhall haue 70. fatham water, and be 10. leagues from Vſhant: but if you finde the ground to be yellow ſhelles and little blacke ſtones, then are you towards the Seames, therefore you muſt with the tide beare off Northward to ſhun Vſhant, but till you finde white ſand, and things like nédles, for ſuch are the grounds of the Channell.

Betwéene Vſhant and the Ile of Baſe, when you ſayle at 4. Fatham water, you are 4. leagues off the ſhore, but by night come no nérer then 25. fatham: When you are two leagues off Obueracke, you ſhall find 25. fatham depth, 8. leagues off the Sept Ilands, you haue 55. fatham.

A league without the Rockes off Obueracke, there is a blind or hidden Rocke, ſo that if you are to ſayle vpon aboord betwéene the Fournes and Obueracke, come no nérer the blind Rocke then 40. fatham, but Eaſtward you may ſayle in 30. or 25. Fatham.

If a Ship ſayling Weſt, S. W. and Southweſt by W. off Silly, at 80. fatham water to be found to be vnder 40. degrées 25. min. of Altitude, ſhe is 26. leagues from Land, and muſt goe Eaſt and by North till ſhée get 66. Fatham water, for then ſhée is in the Channell betwéene Silly and Vſhant, and then if ſhe be bound for

England, ſhe muſt ſayle more Northward, and betweene the Lands end and the Lizard ſhe ſhall haue 55. fatham depth.

The ſoundings and grounds betweene *Ireland*, *England*, and *Normandie*.

THree Leagues without the Ile of Dorſey nere Ireland, it is 45. fatham depe: in the Channell betweene Dorſey and Cape-cleare is 42. or 43. fatham, the Channell from Cape-cleare to Saltees hath 45. fatham, but 2. Leagues off Ireland it hath but forty: betweene Saltees and Milford it is 44. fatham depe, and betweene Lundy and Silly 38. fatham: In the mid-way betweene Silly and Milford is 44. but North of Silly 40. and 42. and nere England by the Lands end, the Channell is of 50. fatham depe.

Comming from Cape Finiſter, ſayling N.N.E. if you haue 80. fatham, you are 20. leagues off the ſhore, and the ground is ſmall blacke ſtones with great red ſand: In the ſame courſe, when you haue but 60. fatham, you are within 12. or 14. leagues of the ſhore, but ſhall not ſo ſone kenne land as you thinke for: you ſhall a great while haue 60. fatham: being at the N. parts of the Channell about Silly: betweene Vſhant and Silly, the Channell is 70. fatham: on the S. ſide of Silly, the ground is ſmall red ſtones, and fine white ſand: Ouer againſt the Lizard and Falmouth 4. leagues from ſhore, is 52. fatham: betwixt Foy and Plimouth ſound, in the Channell nigheſt, is 60. fatham betweene the Lizard and the Start, beare no nerer the ſhore then 35. fatham, you may caſt anker in the trade or channell in 25. fatham, and ſo you ſhall lye within the Foreland ſtreame: betweene Plimouth and the Sept-Ile in the midſt of the Channell is 55. fatham, but 4. leagues S.S.W. off Plimouth is but 35. fatham: S.S.E. of the midland of the Start, is 45. fatham, but from thence 5. or 6. leagues S.E. is 54. fatham: in the Channell betweene the Caskets and Portland is 40. fatham, and a league N. of the Ile of Aldernay is a hole or pit 80. fatham depe: all the reſt of the channell betweene Portland and Aldernay, is of equall depth, viz. 40.

fatham:

fatham: when you are within kenning of Portland, your sounding is 34. fatham: and 2. leagues off Wight, 36. fatham: also 2. leagues Eastward of Beachy, betweene Picardy and Wight, the channell in the middest is 38. fatham: betweene Winchelsey and Picardy, 24. fatham, the shoalds betweene the heads called the Vrowensand, hath but 3. fatham and a halfe, but on the South side of it, is 24. fatham: and in all the faire way betweene Zealand and Douer, it is 24. fatham deepe.

Depths of the North Sea from the *Foreland.*

IN the Channell from England, Foreland, and sands of Flaunders, you haue 24. fatham deepe: but 3. leagues N.W. by W. of the Countrey of Zietrickze called Borbrecke, it hath but foure fatham depth without the shoald: the channell of Zealand is 26. fatham: N.W off Harlem, 8. or 9. miles within the Sea, there beginneth a shelfe called Debreede Verthien, reaching alongst the Coast of Holland to the plaine of Ameland, where it endeth: ouer against Harlem and Egmont, is 13. 14. or 15. fatham, and the ground is full of Mase, mingled with blacke sand like mustard seede: the said shelfe hath 15. 16. or 17. fatham depth: betweene Texell and Vlyeland, where the ground is grosse red sand, 6. or 7. leagues from the shore, for there the shoald is narrower then it is towards the South end of the Channell: without the shoald betweene Zeland and Texell is 26. fatham deepe, as farre as the shoald which the Fishers call Dog-sand. In the Channell on Englands side, ouer against Yarmouth, is 35. fatham, but against Flamborough and Scarborough point 38. Fatham, whereas the white shelfe called Dog-sand beginneth, reaching into the North Seas to the channell of Helichland: this shoald (where it is within kenning of Flamborough point) hath but 9. or 10. fatham, but when in the same sand you finde 12. fatham, then Texell is from you Southeast, almost 30. leagues, but when you are come to 16. fatham, then are you within 21. leagues S.S.E. of Vlyeland.

A Ship that comes from the Riffe, finding 18. Fatham depth

on

on the aforesayd sand, is then 20. leagues South and by East off Vlyeland, but at 22. Fatham, you must then sayle towards the Vlye, South and by West, and South southwest, but if in the Channell of Helichland, 24. or 26. Fatham be found, then must you sayle Southwest, and Southwest by South, and then you come to the Schellingh: but if in Helichland found you haue 27. fatham, then are you altogether to the Eastward off it: betweene the Riffe and the Doggersand, the Channell is 26. Fatham: without the channell Westward, it is 32. fatham deepe.

A Ship that comes out of the English straights, or out of Zealand, hauing at the Riffe 24. Fatham, is from the Naes in Norway, 18. leagues North and by East, but hauing 20. fatham, is but 16. leagues from it North: and finding but 18. fatham, is then 18. leagues off it North by West: The course from thence to the Holmes, is 12. leagues North by East: From thence to the point of Scackghens, 18. leagues Northeast by East, there is a Rocke of one fatham depth, Northeast, and Northeast by East off the Holmes, two leagues from shore.

Depths neere *Iutland* and *Ameland*.

IN the Sea without Iutland, a myle from Dodenberg, is a Banke called Reese-horne, stretching out 8. leagues West by South in some places but 3. Fatham deepe, and in some places may be sayled ouer, and become a Roade for a Northwest and a North wind in 20. fatham: From Ameland towards the Sea, the ground is grosse sand, red and blacke, mingled with shelles: thence Southwards in 16. fath. sayling 3. houres, you shall come to the smoth Sea of Ameland, where the ground is fine sand, with shells: North from Schellingh, in 24. Fatham, is fine white sand, and in 8. fatham, white and blacke sand mingled. Vlyeland hath white sand with shelles, and thin blacke sand in 16. fatham depth: From the West end of Vlyeland, is great and red sand mingled with blacke like vnto Mustard seed: about six or seuen leagues from shore, at the East end off Schellingh to Seawards, at 18. Fatham, is fine white sand mingled with blacke, hauing

in

in it things like nædles. Ouer against Borke in the Westerne Emes 17. or 18. fatham depth, land may be ſéene: the ground is groſſe grauelly ſand: at 14. Fatham may Ameland bée kend, but Schellingh at 16. and Vlyeland at 15. or 16. Fatham water. At the North Hooke of Texell, Land may be ſéene at 16. fatham. Holland at 14. or 15. When you ſayle within the ſhoald called the Bredairthien, which beginneth Northweſt of Harlem, and ſtretcheth alongſt the Coaſt of Holland, to the Weſt end of Vlyeland, it is 7. or 8. leagues from the ſhore.

Soundings and Grounds neere the *Schaw*.

A Great league Weſt by North from the Schaw, is 35. Fatham depth: North northeaſt a great league off the corner of this Point is 38. fatham, and when the Point is Northeaſt from you, then you haue 17. Fatham. Betwéene this Point and Leſon, the Chaunell is 20. Fatham déepe, and the ground like clay or dirt: betwixt Anhout and Waersbergh, in the middeſt of the Chaunell is 22. Fatham water: betwéene Leſon and Anhout, the ground is fine and ſtony: néere Waersbergh, is a ſhoald of 17. Fatham depth: betwéene Anhout and Coll, is another ſhoald of 17. Fatham, where ſometime it is troubleſome like a Whirlpoole.

Depths of the Eaſterne Seas.

BEtwéene Oeland and Gothland, the ſoundings are vnequall, ſometimes of 20. ſomtimes of 23. Fatham, the ground groſſe and blacke ſtony ſand, like peaſe: when the South end of Oeland is 2. leagues from you Weſtwards, you haue 27. fatham, where alſo you may gage water: but when the Chappell of Sudernoorden beareth Weſt northweſt off you, then haue you 31. Fatham, and ground fit to gage water: Ouer against the Rocke in the faire way is 52. fatham, and a clay ground, but fit for gaging: betwéene the greater and leſſer Carta is 14. fatham, vnder which is ſafe roade for Ships, there is a ſhoald betwéene Houberg and Oſtergard,

Ostergard, 4. fatham depth, the ground great redsand, but hardly from thence can you ken Gothland out of the top: there is also to the Eastward another shoald of 36. fatham, which when you are past, you haue more then 40. fatham water: When the point of Righ is 3. leagues Southeast from you, then haue you 30. fatham: but when it is from you halfe a league South South-east, you haue but 15. fatham, the ground is white sand: but when it beareth West a small league from you, then you shall find 16. fatham: ouer against Heel, halfe a league from the shore it is almost 3. fatham déepe: the rode for ships at Heel, hath 25. fatham depth: betwéene Moan and Falsterborne is 14. fatham depth: betwéene Stead and Falsterborne, in the very Channell is but 22. Fatham déepe: néere Falsterborne it is full of shoalds, but néere Stead you haue 13. Fatham water: betwéene Darkeriffe and Southolmen, which is more sholdy, there is 5. fatham wanting two fote: From thence toward the Sound it is something déeper, 6. 7. 8. 9. or 10. fatham.

A Note of certaine and most dangerous places in the Sea.

The principall and most perilous of all, is the Mael-stream-well or Slorp, called the Mouskstreame: which lyeth on the backeside of Norway in 68. degrées on the Northside of an Iland or Rocke called Weeray. This well draweth the water vnto it selfe during the whole flood (which is the space of 6. houres and 12. minutes) with such an indraught and force, and with such a noyse through the tumbling & falling of the waues and streames one vpon the other, that it is rather to wonder at then to write of. So that during that time, within the space of more then two leagues round about that Rocke of Mouske (vnder which that water floweth) no Ship or other vessell may come néere, for they should to their vtter destruction be drawne into it and swallowed vp: but all the time of the ebbe the water is so strongly cast vp againe, that no kinde of substance or Metall, how heauy soeuer it bee, can there sinke. So that our Northerne Fishers at that time

time doe with their Iollen or Fishing Boates, take many and straunge formed fishes, which they drawe into their Boates with Hookes and lines, which they haue ready layd for that purpose: for that during the Ebbe, they cannot returne into the Gulph, nor get vnto the water by any meanes.

The Northerne people that inhabite about those Rockes, doe thinke that streame passeth away vnderneath a part of Norway, vnder the North bottome in East Finland: because that in that place there is likewise such a Maelstreame, (though not altogether so strong nor dangerous) where the like Fishes are taken: and the water is in like sort troublesome, as it is vnderneath, and about the Rocke of Mouske.

Whereupon, many experimented Pilots doe call the said Slorp, the Nauell of the Sea, which causeth the courses of the Ebbes and Floods about the Lands that are on this North side of the Equinoctiall, as the most conuenient place for that purpose, to spread the waters South, North, East and West: that is to say, Northerly towards the Pole Articke, South-easterly on the backe-side of Russia and Tartaria, towards the straight of the great South Sea called Mar del Sur, wherein the Spirits Ilands (called the Molluccas, neere the Equinoctiall) are lying Southward to the North Sea of these Low-Countries: As also on the backside of Scotland and Ireland, towards the Spanish and Atlanticke Seas, and towards the Northwest beyond Izeland, towards Furbishers straights, where it is thought the way vnto Catay may be found.

There are moreouer to bee feared vpon the Westerne Seas, very dangerous streames and Gulphes, as in the Race of Portland, where oftentimes happeth such turning and tumbling of waues and streames, that the Ships which passe that way, are many times in great perill.

Moreouer the Race of Blanquett, betweene Normandy and the Iles of Alderney, roareth and rageth so dangerously, that many Ships fall therein headlong, so deepe, that sodainly they are swallowed vp and sunke to the very bottome.

The Race of Fountney, is more dangerous then all these, wherein

in many ſmall Veſſels and Barkes of Britanny and of other Countries, are ſuddenly deuoured and caſt away: and the entrance of the Garrone, called the Riuer of Burdeaux, betweene the Towers of Cordam, and the Southerne and Northerne Aſſes, is likewiſe very perilous, and many Ships doe often periſh there if the Pilots be not skilfull and well acquainted with the place.

And theſe aforeſaid, being the moſt full of danger, it behoueth each Pilot or Maſter to haue eſpeciall knowledge thereof, and great care to preuent the danger that may enſue vnto them thereby.

The yeeres for which the Tables of the Sunnes place and Declination (following) ſerue.

First.	Second.	Third.	Leape yeere.
1629	1630	1631	1632
1633	1634	1635	1636
1637	1638	1639	1640
1641	1642	1643	1644
1645	1646	1647	1648
1649	1650	1651	1652

Hereafter followeth a moſt excellent, neceſſarie and compendious Kalender, ſhewing the Prime, Epact, Dominicall Letter, Leape yeres and moueable Feaſts, for 24. yeres; incluſiuely comprehending therewith the true day and houre of the Moones Conjunction or Change, for 19. yeeres to come, with the true place of the Sunne, and his Declination from the Equinoctiall, both Northwards and Southwards vpon euery degree thereof, through the 12. Moneths of the yeere.

Yeere of our Lord	Prime.	Epact.	Sunday Letter,	First Sunday in Lent.	Easter day.	Aſcenſion day.	Whit-ſunday.	Trinity Sunday.
1629	15	15	D	Febr. 22	April, 5	May, 14	May 24	May 31
1630	16	26	C	14	Marc. 28	6	16	23
1631	17	7	B	27	April 10	19	29	June 5
1632	18	18	A G	19	1	10	20	May 27
1633	19	29	F	Mar. 10	21	30	June 9	June 16
1634	1	11	E	Febr. 23	6	15	May 25	1
1635	2	22	D	15	Marc. 29	7	17	May 24
1636	3	3	C B	March 6	April 16	25	June 4	June 11
1637	4	14	A	Febr. 26	9	18	May 28	4
1638	5	25	G	11	March 5	3	13	May 20
1639	6	6	F	March 3	April 14	23	June 2	June 9
1640	7	17	E D	Febr. 22	5	14	May 24	May 31
1641	8	28	C	March 7	25	June, 3	June 13	June 20
1642	9	9	B	Febr. 27	10	May, 19	May 29	5
1643	10	20	A	19	2	11	21	May 28
1644	11	1	G F	Marc. 10	21	30	9	16
1645	12	12	E	Febr. 23	April 6	15	25	June 1
1646	13	23	D	15	Marc. 29	Aprill 7	17	May 24
1647	14	4	C	March 7	April, 18	27	June 6	June 13
1648	15	15	B A	Febr. 20	2	11	May 21	May 28
1649	16	26	G	11	Marc. 25	Aprill, 3	13	20
1650	17	7	F	March 3	April. 14	23	June 2	June 9
1651	18	18	E	Febr. 16	Marc. 30	Aprill, 8	May 18	May 25
1652	19	29	D C	March 8	April, 19	28	June 7	June 14

Ianuary hath 31. dayes.

The Prime			Fast.	Leng. of the day. H. M.		True Place and Declination ☉ in ♑. First yeere.	D. M.	D. M.		☉ in ♑ secōd yeere	D. M.	D. M.
viii. 7.	1	A	New	7	52	1	21 38	21 47		1	21 23	21 49
	2	B	yeares d.	7	54	2	22 39	21 37		2	22 24	21 39
2. xvi.	3	C		7	58	3	23 40	21 27		3	23 25	21 29
	4	D		8	0	4	24 41	21 16		4	24 27	21 18
v. 8.	5	E	Fast.	8	3	5	25 43	21 5		5	25 28	21 7
	6	F	Twelfe	8	6	6	26 44	20 53		6	26 29	20 56
1. xiii.	7	G	day.	8	9	7	27 45	20 41		7	27 30	20 44
ii. 10.	8	A	Lucian.	8	12	8	28 46	20 28		8	28 32	20 32
x. 17.	9	B		8	15	9	29 47	20 16		9	29 33	20 19
	10	C		8	18	10	♒ 49	20 3	South Declination.	10	♒ 34	20 5
xviii. 3.	11	D		8	21	11	1 50	19 49		11	1 35	19 52
vii. 4.	12	E		8	24	12	2 51	19 37		12	2 36	19 38
	13	F	Hillary.	8	28	13	3 52	19 21		13	3 37	19 25
2. xv.	14	G		8	32	14	4 53	19 7		14	4 38	19 10
	15	A		8	36	15	5 54	18 51		15	5 39	18 55
iiii. 2.	16	B		8	40	16	6 55	18 37		16	6 40	18 40
xii. 11.	17	C		8	43	17	7 56	18 21		17	7 42	18 25
ix. 5.	18	D		8	46	18	8 57	18 5		18	8 42	18 9
6. j.	19	E		8	49	19	9 58	17 49		19	9 43	17 53
	20	F	Fabian.	8	52	20	10 59	17 32		20	10 44	17 36
	21	G	Agnes.	8	55	21	12 0	17 15		21	11 45	17 19
6. xvii.	22	A	Vincent.	8	58	22	13 1	16 58		22	12 46	17 2
	23	B		9	0	23	14 2	16 41		23	13 47	16 45
vi.	24	C		9	2	24	15 3	16 23		24	14 48	16 27
	25	D	Conuer.	9	4	25	16 4	16 5		25	15 49	16 9
3. xiiij. 2. ij	26	E	of Paul.	9	6	26	17 4	15 47		26	16 50	15 51
11. iii.	27	F		9	9	27	18 5	15 28		27	17 51	15 32
5. xi.	28	G		9	12	28	19 6	15 9		28	18 52	15 13
xix. 4.	29	A		9	15	29	20 7	14 50		29	19 52	14 55
1. viii.	30	B		9	18	30	21 7	14 31		30	20 53	14 35
	31	C		9	21	31	22 8	14 11		31	21 53	14 16

of the Sunne.

	☉ in ♈ third yeere.		South Declination.	☉ in ♈ Leape yere.	
	D. M.	D. M.		D. M	D. M
1	22 9	21 51		1 20 54	21 54
2	23 10	21 41		2 21 55	21 44
3	23 12	21 31		3 22 56	21 34
4	24 13	21 21		4 23 57	21 24
5	25 14	21 10		5 24 59	21 13
6	26 15	20 59		6 25 59	21 2
7	27 16	20 47		7 27 00	20 50
8	28 18	20 35		8 28 2	20 38
9	29 19	20 22		9 29 3	20 25
10	♒ 20	20 9		10 ♒ 4	20 12
11	1 21	19 57		11 1 5	19 59
12	2 22	19 42		12 2 6	19 46
13	3 23	19 28		13 3 7	19 32
14	4 24	19 14		14 4 8	19 18
15	5 25	18 59		15 5 9	19 3
16	6 26	18 44		16 6 10	18 48
17	7 27	18 28		17 7 11	18 33
18	8 28	18 13		18 8 12	18 17
19	9 29	17 57		19 9 13	18 1
20	10 30	17 40		20 10 14	17 44
21	11 31	17 23		21 11 15	17 28
22	12 32	17 6		22 12 16	17 11
23	13 33	16 49		23 13 17	16 53
24	14 34	16 31		24 14 18	16 36
25	15 35	16 13		25 15 19	16 18
26	16 36	15 55		26 16 19	16 0
27	17 37	15 36		27 17 20	15 43
28	18 37	15 18		28 18 21	15 23
29	19 38	14 59		29 19 22	15 4
30	20 39	14 40		30 20 23	14 45
31	21 39	14 20		31 21 24	14 25

Certaine of the most notable fixed Starres of the 1. 2. and 3. bigneſſe, their Magnitude, Declination, and right Aſcention: whereby you may readily finde when any of them are in rule for obſeruation.

1.

Whales tayle, is a ſtarre of the third bigneſſe, whoſe declination is 20. degr. 12. minutes South, and the right aſcention thereof, is 24. minutes of an houre.

2.

Whales backe of the third bignes, declination 12. deg. 20. minutes South, and right aſcention 50. minutes.

3.

Rams hoꝛne, is a ſtarre of the third bigneſſe, whoſe declination is 17. degrees 17. minutes Noꝛth, and his right aſcention is 1. houre 32. minutes.

4.

Rams head, of the third bignes, declination 21. degrees 33. minutes Noꝛth, right aſcention 1. houre 40. minutes.

The Prime				Leng. of the day.		True Place and Declination ☉ in ♒ First yeere.			☉ in ♒ second yere.		
				H. M.		D. M.	D. M.			D. M.	D. M.
2. viii.	1	D	Fast.	9 30	1	23 9	13 51		1	22 55	13 56
7. xvi.	2	E	Purifica.	9 33	2	24 10	13 31		2	23 55	13 36
	3	F	of Mary.	9 37	3	25 11	13 9		3	24 56	13 15
v.	4	G		9 41	4	26 11	12 50		4	25 56	12 55
xiii. 12.	5	A	Agathe.	9 45	5	27 12	12 29		5	26 57	12 34
	6	B		9 50	6	28 12	12 8		6	27 57	12 14
4. ii.	7	C		9 54	7	29 12	11 48		7	28 58	11 52
x.	8	D		9 58	8	♓ 13	11 26		8	29 58	11 31
	9	E		10 2	9	1 13	11 5		9	♓ 59	11 10
8. xviii.	10	F		10 6	10	2 14	10 43		10	1 59	10 49
2. vii.	11	G		10 9	11	3 14	10 21		11	2 59	10 27
	12	A		10 12	12	4 14	10 0		12	3 59	10 5
7. xv.	13	B		10 15	13	5 15	9 37		13	4 59	9 43
	14	C	Valent.	10 18	14	6 15	9 15		14	5 59	9 21
10. iiii.	15	D		10 22	15	7 15	8 53		15	7 0	8 58
3. xii.	16	E		10 25	16	8 15	8 30		16	8 0	8 36
j. 6.	17	F		10 30	17	9 15	8 8		17	9 0	8 14
	18	G		10 34	18	10 15	7 45	South Declination.	18	10 0	7 51
5. ix.	19	A		10 38	19	11 16	7 22		19	11 0	7 28
xvii. 11.	20	B		10 42	20	12 16	6 59		20	12 0	7 5
	21	C		10 46	21	13 16	6 36		21	13 0	6 42
	22	D		10 50	22	14 16	6 13		22	14 0	6 19
3. vi.	23	E	Fast.	10 54	23	15 16	5 50		23	15 0	5 56
xiii. 11.	24	F	Mathias.	10 58	24	16 15	5 27		24	16 0	5 32
2. iii.	25	G		11 2	25	17 15	5 4		25	17 0	5 9
xi. 5.	26	A		11 7	26	18 15	4 40		26	18 0	4 46
	27	B		11 12	27	19 15	4 16		27	19 0	4 22
1. xix.	28	C		11 16	28	20 15	3 53		28	20 0	3 58
	29										

of the Sunne.

	☉ in ♒ third yeere.		South Declination.	☉ in ♒ Leape yere.	
	D. M.	D. M.		D. M.	D. M.
1	22 40	14 0	1	21 56	14 15
2	23 41	13 40	2	22 57	13 55
3	24 41	13 20	3	23 58	13 35
4	25 42	13 0	4	24 59	13 14
5	26 42	12 39	5	26 0	12 54
6	27 43	12 19	6	27 2	12 33
7	28 43	11 58	7	28 3	12 12
8	29 44	11 36	8	29 4	11 50
9	♓ 44	11 15	9	♓ 5	11 26
10	1 44	10 54	10	1 6	11 7
11	2 45	10 32	11	2 7	10 45
12	3 45	10 10	12	3 8	10 23
13	4 45	9 48	13	4 9	10 1
14	5 46	9 26	14	5 10	9 39
15	6 46	9 4	15	6 12	9 16
16	7 46	8 41	16	7 13	8 53
17	8 46	8 19	17	8 14	8 31
18	9 46	7 56	18	9 15	8 8
19	10 46	7 33	19	10 16	7 45
20	11 47	7 10	20	11 17	7 22
21	12 47	6 47	21	12 18	6 58
22	13 47	6 24	22	13 19	6 35
23	14 47	6 1	23	14 19	6 12
24	15 46	5 38	24	15 20	5 48
25	16 46	5 15	25	16 21	5 24
26	17 46	4 51	26	17 22	5 0
27	18 46	4 28	27	18 23	4 37
28	19 46	4 4	28	19 23	4 13
			29	20 24	3 49

5. 1

Bulls eye, is a ſtarre of the firſt bigneſſe, whoſe declination is 15 degr. 38. minutes Northy, and right aſcention 4. houres 13. minutes.

6.

Orions left foote, of the firſt bigneſſe, declination 8. degr. 42. minutes South, right aſcention 4. houres 55. minutes.

7.

Orions left ſhoulder, of the ſecond bignes, declination is 5. degrees 56. minutes North, right aſcention 5. houres 4. minutes.

8.

Firſt in Orions girdle, of the ſecond bignes, declinantion 38. minutes South, right aſcention 5. houres 12. minutes.

9.

Orions right ſhoulder, of the firſt bigneſſe, declination 6. degrees 17. minutes North, right aſcenſion 6. houres 34. minutes.

March hath 31. dayes.

The Prime				Leng. of the day.	True Place and Declination ☉ in ♈ First yeere.			South Declination.	☉ in ♈ second yeere		
				H. M.		D. M	D. M.			D. M	D. M.
	1	D	Dauid.	11 20	1	21 14	3 29		1	21 0	3 35
7. viii.	2	E		11 24	2	22 14	3 6		2	21 59	3 11
xvi. 11.	3	F		11 28	3	23 13	2 42		3	22 59	2 48
	4	G		11 32	4	24 13	2 18		4	23 59	2 24
	5	A		11 36	5	25 13	1 54		5	24 58	2 0
10. v.	6	B		11 40	6	26 12	1 30		6	25 58	1 37
1. xiii. ii. 6	7	C		11 44	7	27 12	1 7		7	26 57	1 13
	8	D		11 48	8	28 11	0 43		8	27 57	0 49
8. x.	9	E		11 52	9	29 10	0 20		9	28 56	0 26
xviii. 7.	10	F		11 56	10	♈ 10	0 4		10	29 55	0 2
	11	G	Gregor.	12 0	11	1 9	0 27		11	♈ 55	0 22
	12	A		12 4	12	2 8	0 51		12	1 54	0 45
8. vii.	13	B		12 8	13	3 8	1 15		13	2 53	1 9
xv. 9.	14	C		12 12	14	4 7	1 38		14	3 53	1 33
	15	D		12 16	15	5 6	2 2		15	4 52	1 56
iiii.	16	E		12 20	16	6 5	2 25		16	5 51	2 20
xii. 6.	17	F		12 24	17	7 4	2 49		17	6 50	2 43
	18	G	Edward.	12 28	18	8 4	3 13	North Declination	18	7 49	3 7
5. i.	19	A		12 32	19	9 3	3 36		19	8 48	3 30
ix. 10.	20	B	Benedic.	12 36	20	10 2	3 59		20	9 47	3 53
	21	C		12 40	21	11 0	4 22		21	10 46	4 17
xvii. 6.	22	D		12 43	22	11 58	4 45		22	11 45	4 40
vi. 11.	23	E		12 47	23	12 58	5 8		23	12 44	5 3
	24	F	Fast.	12 50	24	13 57	5 31		24	13 43	5 26
1. xiiii.	25	G	Anuncia-	12 54	25	14 56	5 54		25	14 42	5 49
iii. 8.	26	A	tion of	12 58	26	15 55	6 17		26	15 41	6 12
	27	B	Mary.	13 2	27	16 53	6 39		27	16 40	6 34
9. xi.	28	C		13 6	28	17 52	7 2		28	17 38	6 56
xix. 3.	29	D		13 12	29	18 51	7 25		29	18 36	7 19
	30	E		13 18	30	19 49	7 47		30	19 35	7 41
viii. 10.	31	F		13 24	31	20 48	8 9		31	20 34	8 4

of the Sunne.

	☉ in ♓ third yeere		☉ in ♓ Leape yeere		
	D. M	D. M.		D. M	D. M.
1	20 45	3 41	1	21 30	3 23
2	21 45	3 17	2	22 30	2 38
3	22 45	2 53	3	23 30	2 35
4	23 44	2 30	4	24 29	2 12
5	24 44	2 6	5	25 28	1 49
6	25 43	1 42	6	26 28	1 25
7	26 43	1 19	7	27 27	1 1
8	27 42	0 55	8	28 26	0 38
9	28 42	0 31	9	29 26	0 14
10	29 41	0 8	10	♈ 25	0 10
11	♈ 40	0 16	11	1 25	0 34
12	1 40	0 40	12	2 24	0 57
13	2 39	1 3	13	3 23	1 21
14	3 38	1 27	14	4 22	1 44
15	4 37	1 50	15	5 22	2 8
16	5 37	2 14	16	6 21	2 31
17	6 35	2 37	17	7 20	2 55
18	7 35	3 1	18	8 19	3 19
19	8 34	3 25	19	9 18	3 42
20	9 33	3 48	20	10 17	4 5
21	10 32	4 11	21	11 15	4 28
22	11 31	4 34	22	12 14	4 51
23	12 30	4 57	23	13 13	5 14
24	13 29	5 20	24	14 12	5 37
25	14 28	5 43	25	15 11	6 0
26	15 26	6 6	26	16 10	6 23
27	16 25	6 29	27	17 8	6 45
28	17 24	6 52	28	18 7	7 9
29	18 23	7 14	29	19 6	7 30
30	19 21	7 36	30	20 4	7 52
31	20 20	7 58	31	21 3	8 15

South Declination.

North Declination.

10.

The great Dog, is a Starre of the first bignes, whose Declination is 16. degrees 12. minutes Southwards, and his right ascension 6. houres 27. minutes.

11.

The little Dog, is a Starre of the first bignes, Declination is 6. degr. 13. min. North, right ascension 7. houres 18. minutes.

12.

Brightest in Hydra, is a starre of the second bignes, declination 6. degr. 53. minutes South, right ascension 9. houres 8. min.

13.

Lyons heart, of the first bignes, declination 13. deg. 55. minutes North, right ascension 9. houres 57. minutes.

14.

Lyons necke, of the second bignes, Declination 21. degr. 52. min. North, right ascension 9. houres 46. minutes.

Aprill hath 31. dayes.

The Prime				Leng. of the day.	☉ in ♈ First yeere.		☉ in ♈ Second yeere.		North Declination.
				H. M.		D. M.	D. M.	D. M	D. M.
	1	G		13 30	1	21 46	8 31	1 21 32	8 25
xvi. 4.	2	A		13 34	2	22 45	8 53	2 22 31	8 48
	3	B		13 38	3	23 44	9 15	3 23 30	9 9
v.	4	C	Ambro.	13 42	4	24 43	9 36	4 24 28	9 31
xiii. 8.	5	D		13 46	5	25 41	9 58	5 25 27	9 53
7. ij.	6	E		13 50	6	26 39	10 19	6 26 25	10 14
x. 5.	7	F		13 53	7	27 37	10 40	7 27 23	10 35
	8	G		13 56	8	28 36	11 1	8 28 22	10 56
2. xviii.	9	A		13 59	9	29 34	11 22	9 29 20	11 17
	10	B		14 2	10	♉ 32	11 42	10 ♉ 18	11 37
vii. 8.	11	C		14 5	11	1 31	12 3	11 1 17	11 58
	12	D		14 8	12	2 29	12 22	12 2 15	12 18
2. xv.	13	E		14 12	13	3 27	12 43	13 3 13	12 38
iiii. 8.	14	F		14 16	14	4 25	13 2	14 4 11	12 58
	15	G		14 20	15	5 24	13 22	15 5 9	13 17
9. xii.	16	A		14 24	16	6 23	13 42	16 6 8	13 37
i. 9.	17	B		14 28	17	7 20	14 1	17 7 6	13 56
	18	C		14 32	18	8 18	14 19	18 8 4	14 15
ix. 2.	19	D		14 36	19	9 16	14 38	19 9 2	14 34
	20	E		14 40	20	10 14	14 56	20 10 0	14 58
2. xvii.	21	F		14 44	21	11 12	15 15	21 10 58	15 12
vi.	22	G		14 47	22	12 10	15 33	22 11 56	15 28
xiiii. 8.	23	A	S. Geor.	14 50	23	13 8	15 50	23 12 54	15 46
	24	B	Fast.	14 53	24	14 7	16 8	24 13 51	16 3
7. iii.	25	C	S. Mark,	14 56	25	15 3	16 25	25 14 49	16 20
xi. 2.	26	D		14 59	26	16 2	16 42	26 15 47	16 37
	27	E		15 2	27	16 59	16 58	27 16 45	16 54
7. xix.	28	F		15 5	28	17 56	17 14	28 17 43	17 11
	29	G		15 8	29	18 54	17 30	29 18 40	17 26
viii. 2.	30	A		15 12	30	19 52	17 47	30 19 38	17 42

of the Sunne.

	☉ in ♈ third yeere.		☉ in ♈ Leape yere.	
	D. M.	D. M.	D. M.	D. M.
1	21 18	8 20	22 3	8 37
2	22 17	8 42	23 1	8 59
3	23 16	9 4	24 0	9 21
4	24 14	9 26	24 58	9 42
5	25 13	9 47	25 57	10 3
6	26 11	10 9	26 55	10 25
7	27 10	10 30	27 54	10 46
8	28 8	10 51	28 52	11 7
9	29 6	11 12	29 50	11 27
10	♉ 4	11 32	♉ 49	11 48
11	1 3	11 53	1 47	12 8
12	2 1	12 13	2 45	12 28
13	2 59	12 33	3 43	12 48
14	3 57	12 53	4 41	13 7
15	4 55	13 11	5 39	13 27
16	5 54	13 32	6 38	13 47
17	6 52	13 51	7 36	14 6
18	7 50	14 10	8 34	14 25
19	8 48	14 29	9 32	14 43
20	9 46	14 48	10 30	15 1
21	10 44	15 6	11 28	15 20
22	11 42	15 24	12 26	15 37
23	12 39	15 41	13 24	15 55
24	13 37	15 59	14 21	16 12
25	14 35	16 16	15 19	16 29
26	15 33	16 33	16 17	16 46
27	16 31	16 49	17 15	17 3
28	17 29	17 7	18 13	17 19
29	18 26	17 23	19 10	17 35
30	19 24	17 38	20 8	17 50

North Declination.

15.

Lyons backe, is a starre of the second bignes, whose declination is 22. degrees 43. minutes Northward, and his right ascention is 10. houres, 52. minutes.

16.

Lyons tayle, of the first bingnes, declination 16. degrees 50. minutes North, right ascention 11. houres 29. minutes.

17.

Rauens wing, of the third bignes, declination 15. degrees 50. minutes South, right ascention 11. houres 56. minutes.

18.

Virgins spike, of the first bignesse declination 9. degrees South, right ascention 13. houres 5. minutes.

The Prime			Fast.	Leng. of the day.	☉ in ♈ First yeere.			☉ in ♈ secõd yeere.		
				H. M.		D. M.	D. M.		D. M	D. M
11. viii.	1	B	Phil. and	15 16	1	20 50	18 2	1	20 36	17 58
6. xvi.	2	C	Iacob.	15 20	2	21 47	18 17	2	21 34	18 13
v. 9.	3	D	Inuentiõ	15 23	3	22 45	18 32	3	22 31	18 28
	4	E	Crosse.	15 26	4	23 43	18 46	4	23 29	18 43
8. xiii. ii. 4.	5	F		15 29	5	24 40	19 0	5	24 26	18 57
	6	G	Ioh. Port.	15 32	6	25 38	19 14	6	25 24	19 11
4. x.	7	A	Latin.	15 35	7	26 35	19 28	7	26 22	19 25
	8	B		15 38	8	27 33	19 41	8	27 19	19 38
xviii. 9.	9	C		15 40	9	28 30	19 54	9	28 17	19 51
	10	D		15 42	10	29 28	20 7	10	29 14	20 3
3. vii.	11	E		15 44	11	♊ 25	20 19	11	♊ 12	20 16
xv. 8.	12	F		15 46	12	1 23	20 31	12	1 10	20 28
	13	G		15 48	13	2 20	20 42	13	2 6	20 39
8. iiii.	14	A		15 50	14	3 18	20 53	14	3 4	20 51
xii.	15	B		15 53	15	4 15	21 4	15	4 1	21 2
	16	C		15 56	16	5 12	21 15	16	4 59	21 12
	17	D		15 58	17	6 10	21 25	17	5 56	21 22
j.	18	E		16 0	18	7 7	21 35	18	6 53	21 32
6. ix.	19	F	Dunstan.	16 3	19	8 5	21 44	19	7 51	21 42
xvii. 11.	20	G		16 6	20	9 2	21 53	20	8 48	21 51
vi. 8.	21	A		16 9	21	9 59	22 2	21	9 45	22 0
	22	B		16 12	22	10 56	22 10	22	10 43	22 8
8. xiiij.	23	C		16 14	23	11 54	22 18	23	11 40	22 16
iij. 1.	24	D		16 16	24	12 51	22 25	24	12 37	22 23
	25	E		16 18	25	13 48	22 32	25	13 35	22 31
10. xi.	26	F	August.	16 20	26	14 45	22 39	26	14 32	22 37
xix. 6.	27	G		16 22	27	15 43	22 45	27	15 29	22 44
	28	A		16 24	28	16 40	22 51	28	16 26	22 50
	29	B		16 26	29	17 37	22 57	29	17 24	22 56
8. viii.	30	C		16 27	30	18 34	23 2	30	18 20	23 1
xvi. 6.	31	D		16 28	31	19 31	23 7	31	19 18	23 6

North Declination.

of the Sunne.

	☉ in ♉ third yeere.		☉ in ♉ Leape yere.	
	D. M.	D. M.	D. M.	D. M.
1	20 22	17 54	21 6	18 6
2	21 20	18 10	22 3	18 21
3	22 13	18 24	23 1	18 36
4	23 16	18 39	23 58	18 50
5	24 13	18 54	24 56	19 4
6	25 10	19 8	25 54	19 18
7	26 8	19 21	26 52	19 32
8	27 5	19 35	27 49	19 45
9	28 3	19 48	28 46	19 57
10	29 0	20 0	29 44	20 10
11	29 58	20 13	♊ 41	20 22
12	♊ 55	20 25	1 39	20 34
13	1 53	20 37	2 36	20 45
14	2 50	20 48	3 33	20 56
15	3 47	21 59	4 31	20 7
16	4 45	21 10	5 29	21 18
17	5 42	21 20	6 26	21 28
18	6 39	21 30	7 23	21 37
19	7 37	21 40	8 20	21 46
20	8 34	21 49	9 18	21 55
21	9 32	21 58	10 15	22 4
22	10 29	22 6	11 12	22 12
23	11 26	22 14	12 9	22 20
24	12 23	22 22	13 7	22 27
25	13 21	22 29	14 4	22 34
26	14 18	22 36	15 1	22 41
27	15 15	22 42	15 58	22 47
28	16 12	22 48	16 55	22 53
29	17 10	22 54	17 53	22 58
30	18 7	23 59	18 50	23 3
31	19 4	23 4	19 47	23 8

North Declination.

19.

Arcturus or betwixt bootes thighes, is a ſtarre of the firſt bigneſſe, whoſe declination is 21. degrées 20. min. North, and his right aſcenſion is 13. houres 55. minutes.

20.

South Balance, of the ſecond bigneſſe, Declination 14. degrées 14. minutes South, right aſcenſion 14. houres 30. minutes.

21.

North Balance, of the ſecond bignes, declination 7. degrées 46. minutes South, right aſcention 14. houres 55. minutes.

22.

Scorpions heart, is a ſtarre of the firſt bigneſſe, whoſe declination is 25. degrees 25. minutes South, right aſcenſion 16. houres 6. minutes.

Iune hath 30. dayes.

The Prime				Leng. of the day.	True Place and Declination. ☉ in ♊ First yeere.			☉ in ♋ secõd yeere		
				H. M.		D. M.	D. M.		D. M.	D. M.
	1	E		16 28	1	20 29	23 11	1	20 15	23 10
8. v.	2	F		16 28	2	21 26	23 15	2	21 12	23 14
1. xiii.	3	G		16 29	3	22 23	23 18	3	22 9	23 17
7. ii.	4	A		16 29	4	23 20	23 21	4	23 6	23 21
x. 10.	5	B	Boniface.	16 29	5	24 17	23 24	5	24 4	23 23
	6	C		16 29	6	25 14	23 26	6	25 1	23 26
xviii. 6.	7	D		16 30	7	26 11	23 28	7	25 58	23 28
	8	E		16 30	8	27 9	23 30	8	26 55	23 29
vii. 8.	9	F		16 30	9	28 6	23 31	9	27 52	23 30
	10	G		16 30	10	29 3	23 31	10	28 49	23 31
9. xv.	11	A	Barnaby.	16 30	11	30 0	23 31	11	29 46	23 31
11. iiii.	12	B		16 30	12	♋ 57	23 31	12	♋ 43	23 31
xii. 10.	13	C		16 30	13	1 54	23 31	13	1 40	23 31
	14	D		16 30	14	2 51	23 30	14	2 38	23 30
	15	E		16 30	15	3 48	23 28	15	3 35	23 29
9. i.	16	F		16 30	16	4 45	23 26	16	4 32	23 27
ix. 9.	17	G		16 29	17	5 42	23 24	17	5 29	23 25
	18	A		16 29	18	6 38	23 21	18	6 26	23 22
xvii. 2.	19	B		16 28	19	7 37	23 18	19	7 23	23 19
8. vi.	20	C	Edward.	16 27	20	8 34	23 15	20	8 20	23 16
xiiij.	21	D		16 26	21	9 31	23 11	21	9 17	23 12
iij. 11.	22	E		16 25	22	10 28	23 7	22	10 14	23 8
	23	F	Fast.	16 24	23	11 25	23 2	23	11 11	23 3
xi. 3.	24	G	Iohn Ba.	16 23	24	12 22	22 57	24	12 8	22 58
	25	A		16 22	25	13 19	22 51	25	13 6	22 53
3. xix.	26	B		16 20	26	14 16	22 45	26	14 3	22 47
	27	C		16 18	27	15 14	22 39	27	15 0	22 41
viii. 4.	28	D	Fast.	16 16	28	16 11	22 32	28	15 57	22 34
	29	E	S. Peter.	16 14	29	17 8	22 25	29	16 54	22 27
8. xvi.	30	F		16 13	30	18 5	22 18	30	17 51	22 20

North Declination.

of the Sunne.

☉ in ♈ third yeere			☉ in ♈ Leape yeer		
	D. M.	D. M.		D. M	D. M.
1	20 2	23 9	1	20 44	23 12
2	20 58	23 13	2	21 42	23 16
3	21 55	23 17	3	22 40	23 19
4	22 53	23 20	4	23 36	23 22
5	23 50	23 23	5	24 33	23 25
6	24 47	23 25	6	25 30	23 27
7	25 44	23 27	7	26 27	23 29
8	26 41	23 29	8	27 24	23 30
9	27 38	23 30	9	28 21	23 30
10	28 35	23 31	10	29 19	23 31
11	29 32	23 31	11	♋ 17	23 31
12	♋ 30	23 31	12	1 13	23 31
13	1 27	23 31	13	2 10	23 30
14	2 24	23 30	14	3 7	23 29
15	3 21	23 29	15	4 4	23 28
16	4 18	23 27	16	5 1	23 26
17	5 15	23 25	17	5 58	23 23
18	6 12	23 23	18	6 55	23 21
19	7 9	23 20	19	7 52	23 17
20	8 6	23 17	20	8 49	23 14
21	9 2	23 13	21	9 47	23 10
22	10 0	23 9	22	10 45	23 5
23	10 58	23 4	23	11 41	23 0
24	11 55	22 59	24	12 38	22 55
25	12 52	22 54	25	13 35	22 50
26	13 49	22 48	26	14 32	22 44
27	14 46	22 42	27	15 29	22 37
28	15 43	22 36	28	16 26	22 31
29	16 40	22 29	29	17 23	22 23
30	17 37	22 23	30	18 21	22 16

North Declination.

23.

Hercules head, is a Starre of the third bignes, whose Declination is 14. degrees 57. minutes North, and right ascension 16. houres 57. minutes.

24.

Eagles heart, is a Starre of the second bignes, Declination 17. degrees, 54. min. North, right ascension 19. houres 32. minutes.

25.

Dolphins tayle, of the third bignes, declination 10. degrees North, right ascension 20. houres, 16. minutes.

26.

Goates tayle, of the third bignes, declination 17. degrees 51. minutes South, right ascension 21. houres 27. minutes.

Iuly hath 31. dayes.

The Prime				Leng. of the day.		True Place and Declination										
						☉ in ♋ First yeere.					☉ in ♋ secōd yeere					
				H.	M.		D.	M.	D.	M.			D.	M	D.	M.
2. v.	1	G	Visitati.	16	12	1	19	2	22	10		1	18	48	22	12
xiii. 8.	2	A	Mary.	16	10	2	19	59	22	2		2	19	45	22	4
ii. 7.	3	B	Martin.	16	8	3	20	56	21	53		3	20	43	21	55
	4	C		16	6	4	21	53	21	44		4	21	40	21	46
x.	5	D		16	4	5	22	51	21	35		5	22	37	21	37
	6	E		16	1	6	23	48	21	25		6	23	34	21	28
4. xviii.	7	F		15	57	7	24	45	21	15		7	24	31	21	18
	8	G		15	54	8	25	42	21	5		8	25	29	21	7
9. vii.	9	A		15	51	9	26	39	20	54		9	26	26	20	56
xv.	10	B		15	48	10	27	37	20	43		10	27	23	20	45
iiii. 8.	11	C		15	46	11	28	35	20	31	North Declination.	11	28	20	20	34
	12	D		15	44	12	29	31	20	19		12	29	17	20	22
3. xii.	13	E		15	41	13	♌	28	20	7		13	♌	15	20	10
	14	F		15	38	14	1	26	19	55		14	1	12	19	58
j. 6.	15	G	Swithin.	15	35	15	2	23	19	42		15	2	9	19	45
	16	A		15	32	16	3	20	19	29		16	3	7	19	32
2. ix.	17	B		15	29	17	4	18	19	15		17	4	4	19	18
xvii. 10.	18	C		15	26	18	5	15	19	1		18	5	1	19	5
vi.	19	D	Dog.da.b	15	23	19	6	12	18	47		19	5	59	18	51
xiiii. 8.	20	E	Margaret	15	20	20	7	10	18	33		20	6	56	18	36
	21	F		15	17	21	8	7	18	18		21	7	53	18	22
iii.	22	G	Magdal.	15	13	22	9	4	18	3		22	8	51	18	7
	23	A		15	10	23	10	2	17	48		23	9	48	17	51
6. xi.	24	B	Fast.	15	8	24	10	59	17	32		24	10	46	17	36
xix. 11.	25	C	S. Iames.	15	5	25	11	57	17	16		25	11	43	17	20
	26	D	Anna.	15	3	26	12	54	17	0		26	12	40	17	4
	27	E		15	0	27	13	52	16	43		27	13	38	16	47
9. viii.	28	F		14	57	28	14	49	16	27		28	14	35	16	31
xvi.	29	G		14	55	29	15	47	16	10		29	15	33	16	14
v. 7.	30	A		14	52	30	16	44	15	52		30	16	31	15	57
	31	B		14	50	31	17	42	15	35		31	17	28	15	39

of the Sunne.

	☉ in ♑ third yeere		☉ in ♑ Leape yeere		North Declination.
	D. M	D. M.	D. M	D. M.	
1	18 34	22 14	19 17	22 8	
2	19 32	22 6	20 15	22 0	
3	20 29	21 57	21 12	21 51	
4	21 26	21 49	22 9	21 42	
5	22 23	21 40	23 7	21 32	
6	23 20	21 30	24 4	21 23	
7	24 17	21 20	25 0	21 12	
8	25 15	21 10	25 58	21 2	
9	26 12	20 59	26 55	20 51	
10	27 9	20 48	27 53	20 40	
11	28 6	20 37	28 50	20 28	
12	29 4	20 25	29 47	20 16	
13	♌ 1	20 13	♌ 44	20 4	
14	0 55	20 2	1 42	19 51	
15	1 53	19 49	2 39	19 38	
16	2 50	19 36	3 36	19 25	
17	3 47	19 22	4 33	19 12	
18	4 45	19 9	5 31	18 58	
19	5 42	18 55	6 28	18 43	
20	6 39	18 41	7 26	18 29	
21	7 37	18 26	8 23	18 14	
22	8 34	18 11	9 20	17 59	
23	9 32	17 57	10 18	17 43	
24	10 30	17 40	11 15	17 28	
25	11 27	17 24	12 13	17 12	
26	12 20	17 9	13 10	16 56	
27	13 22	16 50	14 8	16 39	
28	14 19	16 36	15 5	16 22	
29	15 17	16 19	16 3	16 5	
30	16 14	16 2	17 0	15 48	
31	17 12	15 44	17 58	15 30	

27.

Pegasus shoulder, of the 2. bignes, declination 12. deg. 58. min. North, right ascension 22. houres, 46, minutes.

28.

Pegasus Leg, of the third bignes, declination 25. deg. 58. minutes North, right ascension 22. houres 44. minutes.

29.

Swans tayle, is a Starre of the second bignes, whose Declination is 43. deg. 54. min. North, right ascension 20. houres 30. minutes

30.

The Waggoners right shoulder, is a Starre of the second bignes, Declination 43. degrees 49. minutes North, and right ascension 5. houres 30. minutes.

31.

Hircus the Goate, of the first bignesse, declination 45. degrees 30. minutes, right ascention 4. houres, 49. minutes.

32.

Lira of the first bignesse, North Declination 38. degrees 30. minutes, right ascension 18. houres, 20. minutes.

The Prime				Leng. of the day.	True Place and Declination. ☉ in ♌ First yeere.			North Declination.	South Declination.	☉ in ♌ ſecõd yeere.		
				H. M.		D. M.	D. M.				D. M.	D. M.
6. xiii.	1	C	Lammas.	14 46	1	18 49	15 17			1	18 26	15 21
2. ii.	2	D		14 42	2	19 37	14 56			2	19 23	15 4
	3	E		14 38	3	20 35	14 41			3	20 21	14 45
7. x.	4	F		14 34	4	21 33	14 22			4	21 19	14 27
xviii. 9.	5	G		14 40	5	22 30	14 4			5	22 17	14 8
	6	A		14 36	6	23 28	13 45			6	23 14	13 49
vii.	7	B		14 32	7	24 26	13 25			7	24 11	13 30
xv. 7.	8	C		14 28	8	25 24	13 5			8	25 10	13 10
	9	D		14 23	9	26 21	12 47			9	26 8	12 51
5. iiii.	10	E	Lawren.	14 16	10	27 19	12 27			10	27 5	12 32
xii. 11.	11	F		14 9	11	28 17	12 7			11	28 3	12 12
	12	G		14 6	12	29 15	11 47			12	29 1	11 51
	13	A		14 3	13	♍ 13	11 27			13	29 56	11 31
3. i.	14	B		14 0	14	1 11	11 6			14	♍ 57	11 11
ix. 12.	15	C		13 56	15	2 9	10 45			15	1 55	10 51
	16	D		13 52	16	3 7	10 24			16	2 53	10 29
vi. 7. xvii.	17	E		13 50	17	4 5	10 3			17	3 51	10 8
	18	F		13 44	18	5 3	9 42			18	4 49	9 47
9. xiiij.	19	G		13 40	19	6 1	9 20			19	5 47	9 25
	20	A		13 35	20	6 59	8 59			20	6 45	9 4
8. iij.	21	B		13 30	21	7 57	8 37			21	7 43	8 42
xi. 9.	22	C		13 25	22	8 55	8 15			22	8 41	8 21
	23	D	Faſt.	13 20	23	9 53	7 53			23	9 40	7 58
xix. 4.	24	E	Barthol.	13 15	24	10 51	7 31			24	10 36	7 37
	25	F	Apoſtle.	13 10	25	11 50	7 9			25	11 34	7 15
viii.	26	G		13 6	26	12 48	6 47			26	12 33	6 52
xvi. 8.	27	A		13 2	27	13 46	6 24			27	13 31	6 30
	28	B		12 58	28	14 44	6 2			28	14 29	6 8
7. v.	29	C	Behead.	12 54	29	15 43	5 39			29	15 28	5 45
xiii. 5.	30	D	of Iohn.	12 51	30	16 42	5 16			30	16 26	5 22
	31	E		12 48	31	17 40	4 53			31	17 25	4 56

of the Sunne.

	☉ in ♌ third yeere.		☉ in ♌ Leape yere.		
	D. M	D. M.		D. M	D. M.
1	18 12	15 26	1	18 56	15 12
2	19 9	15 8	2	19 54	14 54
3	20 7	14 50	3	20 51	14 36
4	21 5	14 31	4	21 48	14 17
5	22 2	14 13	5	22 46	13 59
6	23 0	13 54	6	23 44	13 39
7	23 58	13 35	7	24 42	13 20
8	24 56	13 15	8	25 40	13 1
9	25 53	12 56	9	26 37	12 41
10	26 51	12 36	10	27 35	12 21
11	27 49	12 16	11	28 33	12 1
12	28 47	11 56	12	29 31	11 41
13	29 45	11 36	13	♍ 29	11 20
14	♍ 43	11 16	14	1 27	11 0
15	1 41	10 55	15	2 25	10 39
16	2 39	10 34	16	3 23	10 18
17	3 37	10 13	17	4 21	9 57
18	4 35	9 52	18	5 19	9 36
19	5 33	9 31	19	6 17	9 14
20	6 31	9 9	20	7 15	8 53
21	7 29	8 48	21	8 13	8 31
22	8 27	8 26	22	9 11	8 9
23	9 25	8 4	23	10 9	7 47
24	10 23	7 42	24	11 8	7 25
25	11 22	7 20	25	12 6	7 3
26	12 20	6 57	26	13 5	6 40
27	13 19	6 35	27	14 3	6 18
28	14 17	6 12	28	15 1	5 55
29	15 15	5 50	29	15 59	5 33
30	16 14	5 27	30	16 58	5 10
31	17 12	5 4	31	17 56	4 47

North Declination.

33.

Perſeus right ſide, of the ſecond bignes, declination 47. deg. North, right aſcenſion 2. houres, 56. minutes.

34.

Fomahand, is a ſtarre of the firſt bignes, hauing South Declination 33. deg. 15. min. and right aſcenſion 22. houres 40. minutes.

35.

In the knee of Sagitarius, is a ſtarre of the ſecond bignes, hauing South declination 42. degr. and right aſcenſion 18. houres 44. minutes.

Starres neere about the North Pole, with their diſtance from the ſaid Pole.

1.

The Pole ſtarre is of the third bignes, whoſe diſtance from the Pole is 2. degr. 52. min. and his right aſcenſion is 50. minutes.

2.

The formoſt Guard, of the 2. bignes, diſtant from the Pole 14. degr. 11. min. right aſcention 14. hou. 54. min.

3.

The hindermoſt Guard of the 2. bignes, diſtant 16 deg. 42. min. right aſcenſion 15. houres, 26. minutes.

Septem-

September hath 30. dayes.

The Prime				Leng. of the day.	True Place and Declination. ☉ in my First yeere.			North Declination.	☉ in my second yeere.			South Declination.
				H. M.		D. M.	D. M.			D. M.	D. M.	
12. ii.	1	F	Giles.	12 48	1	18 39	4 30		1	81 24	4 36	
x. 8.	2	G		12 44	2	19 37	4 7		2	19 23	4 13	
	3	A		12 40	3	20 36	3 44		3	20 20	3 50	
3. xviii.	4	B		12 36	4	21 35	3 21		4	21 20	3 27	
vii. 7.	5	C	Dog. day.	12 32	5	22 33	2 58		5	22 19	3 4	
	6	D	cnd.	12 28	6	23 32	2 35		6	23 18	2 40	
9. xv.	7	E	Nat. Eli.	12 24	7	24 31	2 11		7	24 16	2 17	
iiii. 9.	8	F	Nat. Ma.	12 20	8	25 29	1 48		8	25 15	1 34	
	9	G		12 16	9	26 28	1 27		9	26 13	1 31	
xii. 2.	10	A		12 12	10	27 27	1 1		10	27 12	1 7	
	11	B		12 8	11	28 26	0 38		11	28 11	0 43	
i. 11.	12	C		12 4	12	29 25	0 14		12	29 10	0 20	
	13	D		12 0	13	♎ 24	0 10		13	♎ 9	0 4	
2. ix.	14	E	Hol. Cro.	11 56	14	1 23	0 33		14	1 8	0 27	
xvii. 8.	15	F		11 52	15	2 21	0 56		15	2 7	0 51	
8. vi.	16	G		11 48	16	3 20	1 20		16	3 6	1 14	
xiiij. 2.	17	A	Lambar.	11 44	17	4 19	1 43		17	4 5	1 38	
	18	B		11 40	18	5 18	2 7		18	5 4	2 1	
iij. 7.	19	C		11 36	19	6 18	2 31		19	6 3	2 25	
	20	D	Fast.	11 32	20	7 17	2 54		20	7 2	2 48	
xi. 2.	21	E	Mathew.	11 28	21	8 16	3 17		21	8 1	3 11	
	22	F		11 24	22	9 15	3 41		22	9 0	3 35	
5. xix.	23	G		11 20	23	10 15	4 4		23	10 0	3 58	
viii. 9.	24	A		11 16	24	11 14	4 28		24	10 59	4 2	
	25	B	Ciprian.	11 12	25	12 13	4 51		25	11 59	4 4	
8. xvi.	26	C		11 8	26	13 13	5 14		26	12 58	5 8	
v. 5.	27	D		11 4	27	14 12	5 37		27	13 58	5 32	
	28	E	Fast.	11 0	28	15 12	6 0		28	14 57	5 55	
4. xiii.	29	F	S. Mich.	10 56	29	16 11	6 23		29	15 57	6 18	
ii. 6.	30	G	Hierom.	10 52	30	17 11	6 46		30	16 56	6 41	

of the Sunne.

☉ in my third yeere					☉ in my Leape yeere			
	D.	M.	D.	M.		D.	M.	D. M.
1	18	11	4	41	1	18	55	4 24
2	19	9	4	19	2	19	53	4 1
3	20	8	3	55	3	20	52	3 38
4	21	6	3	32	4	21	51	3 15
5	22	5	3	9	5	22	49	2 52
6	23	3	2	46	6	23	48	2 28
7	24	2	2	23	7	24	47	2 5
8	25	1	1	59	8	25	46	1 41
9	26	0	1	36	9	26	45	1 18
10	26	58	1	13	10	27	43	0 55
11	27	57	0	49	11	28	42	0 31
12	28	56	0	26	12	29	41	0 9
13	29	55	0	2	13	♍	40	0 16
14	♍	54	0	22	14	1	39	0 49
15	1	53	0	45	15	2	38	1 3
16	2	52	1	9	16	3	37	1 27
17	3	51	1	32	17	4	36	1 50
18	4	50	1	56	18	5	35	2 14
19	5	49	2	19	19	6	34	2 37
20	6	48	2	43	20	7	33	3 0
21	7	47	3	6	21	8	32	3 24
22	8	47	3	30	22	9	32	3 47
23	9	46	3	53	23	10	31	4 11
24	10	45	4	16	24	11	30	4 34
25	11	45	4	40	25	12	30	4 57
26	12	44	5	3	26	13	29	5 20
27	13	43	5	25	27	14	29	5 44
28	14	43	5	49	28	15	28	6 7
29	15	42	6	12	29	16	27	6 26
30	16	42	6	35	30	17	27	6 52

North Declination.

South Declination.

4.

The end of the Dragons tayle of the third bigneſſe, diſtant from the Pole 18. degr. 26. minutes, right aſcention 11. houres, 8. minutes.

5.

The great Beares backe of the ſecond bigneſſe, diſtant from the Pole 26. degrées 5. minutes right aſcention 10. houres 40. minutes.

6.

Cepheus right ſhoulder of the third bigneſſe, diſtant 29. degrées, right aſcention 21. houres 10. minutes.

7.

The great Beares ſide, of the ſecond bignes, diſtant 31. degr. 26. min. right aſcenſion 10. houres 58. minutes.

8.

The firſt in her tayle of the ſecond bignes, diſtant 31. degrées 49. min. right aſcenſion 12. houres, 32. minutes.

October hath 31. dayes.

The Prime				Leng. of the day.	True Place and Declination ☉ in ♎ First yeere.			☉ in ♎ second yeere		
				H. M.		D. M.	D. M.		D. M.	D. M.
	1	A		10 48	1	18 10	7 9	1	17 56	7 4
2. x.	2	B		10 44	2	19 10	7 32	2	18 55	7 26
xviii. 10.	3	C		10 40	3	20 9	7 54	3	19 55	7 49
	4	D		10 36	4	21 9	8 17	4	20 55	8 12
8. vii.	5	E		10 32	5	22 9	8 39	5	21 54	8 34
xv.	6	F	Faith.	10 28	6	23 9	9 2	6	22 54	8 56
	7	G		10 24	7	24 8	9 24	7	23 54	9 18
iiii. 1.	8	A		10 20	8	25 8	9 46	8	24 54	9 40
	9	B	Denis.	10 16	9	26 8	10 8	9	25 54	10 2
4. xii.	10	C		10 12	10	27 8	10 29	10	26 53	10 24
	11	D		10 8	11	28 8	10 51	11	27 53	10 46
j.	12	E		10 4	12	29 8	11 12	12	28 53	11 7
ix. 10.	13	F	Edward.	10 0	13	♏ 8	11 34	13	29 53	11 28
xvii. 17.	14	G		9 56	14	1 8	11 55	14	♏ 53	11 49
vi. 3.	15	A		9 52	15	2 8	12 15	15	1 53	12 11
	16	B		9 48	16	3 8	12 36	16	2 54	12 31
8. xiiij.	17	C	Fast.	9 44	17	4 8	12 57	17	3 54	12 52
	18	D	S. Luke.	9 40	18	5 8	13 17	18	4 54	13 11
iij.	19	E		9 36	19	6 9	13 37	19	5 54	13 32
	20	F		9 32	20	7 9	13 57	20	6 54	13 52
6. xi.	21	G		9 28	21	8 9	14 16	21	7 55	14 12
xix. 8.	22	A		9 24	22	9 10	14 36	22	8 55	14 31
	23	B		9 20	23	10 10	14 55	23	9 55	14 50
7. viii.	24	C		9 17	24	11 10	15 14	24	10 56	15 10
xvi. 2.	25	D	Crispin.	9 14	25	12 11	15 33	25	11 56	15 28
	26	E		9 10	26	13 11	15 51	26	12 56	15 47
4. v.	27	F	Fast.	9 7	27	14 12	16 9	27	13 57	16 5
	28	G	Simon & Iude.	9 4	28	15 12	16 27	28	14 57	16 23
11. xiii.	29	A		9 0	29	16 13	16 45	29	15 58	16 41
2. ii.	30	B		8 56	30	17 13	17 2	30	16 58	16 58
x. 11.	31	C		8 52	31	18 14	17 19	31	17 59	17 15

South Declination.

of the Sunne.

☉ in ♎ third yeere			☉ in ♎ Leape yeere		
	D. M.	D. M.		D. M.	D. M.
1	17 41	6 58	1	18 27	7 15
2	18 41	7 21	2	19 26	7 38
3	19 41	7 44	3	20 26	8 1
4	20 40	8 6	4	21 26	8 23
5	21 40	8 28	5	22 25	8 45
6	22 40	8 51	6	23 25	9 8
7	23 39	9 13	7	24 25	9 30
8	24 39	9 38	8	25 25	9 52
9	25 39	9 57	9	26 25	10 14
10	26 39	10 19	10	27 24	10 35
11	27 39	10 41	11	28 24	10 57
12	28 39	11 2	12	29 24	11 18
13	29 39	11 23	13	♏ 24	11 39
14	♏ 39	11 44	14	1 24	12 0
15	1 39	12 5	15	2 24	12 21
16	2 39	12 26	16	3 25	12 42
17	3 39	12 47	17	4 25	13 2
18	4 39	13 6	18	5 25	13 22
19	5 39	13 27	19	6 25	13 42
20	6 40	13 47	20	7 25	14 2
21	7 40	14 7	21	8 26	14 22
22	8 40	14 26	22	9 26	14 41
23	9 41	14 46	23	10 26	15 0
24	10 41	15 5	24	11 26	15 19
25	11 41	15 24	25	12 27	15 38
26	12 42	15 42	26	13 27	15 56
27	13 42	16 0	27	14 28	16 14
28	14 43	16 19	28	15 29	16 32
29	15 43	16 36	29	16 29	16 49
30	16 44	16 54	30	17 30	17 7
31	17 44	17 11	31	18 30	17 24

North Declination.

9.

At the knées of Cassiopeia, is a Starre of the second bignes, distant from the Pole, 31 degr. 50 minutes, right ascension 1. houre.

10.

In her lippe is a Starre of the third bignesse, distant 31. deg. 26. minutes, right ascension 32. minutes.

11.

The backe of her Chaire, of the third bignesse, distant 33. degrees 2. minutes right ascension 23. houres 48. minutes.

12.

The great Beares thigh of the second bignesse, distant from the Pole 34. degrees 3. minutes right ascension 11. houres 32. minutes.

Nouember hath 30. dayes.

The Prime				Leng. of the day.	☉ in m First yeere		☉ in m second yeere		South Declination.
					True Place and Declination				
				H. M.	D. M.	D. M.	D. M.	D. M.	
	1	D	All Saint.	8 49	1 19 14	17 36	1 18 59	17 32	
5. xviii.	2	E		8 46	2 20 15	17 52	2 20 0	17 48	
vii. 3.	3	F		8 43	3 21 16	18 8	3 21 1	18 5	
	4	G		8 40	4 22 16	18 24	4 22 2	18 20	
11. xv.	5	A	Poud. Tr.	8 37	5 23 17	18 40	5 23 2	18 36	
	6	B	Leonard.	8 34	6 24 18	18 55	6 24 3	18 51	
5. iiii.	7	C		8 31	7 25 19	19 10	7 25 4	19 6	
	8	D		8 28	8 26 19	19 24	8 26 5	19 21	
11. xii.	9	E		8 25	9 27 20	19 38	9 27 5	19 35	
j. 12.	10	F		8 22	10 28 21	19 52	10 28 6	19 48	
	11	G	S. Mart.	8 19	11 29 22	20 5	11 29 7	20 2	
2. ix.	12	A		8 16	12 ♐ 23	20 18	12 ♐ 8	20 15	
xvii. 4.	13	B		8 13	13 1 24	20 31	13 1 9	20 28	
8. vi.	14	C		8 10	14 2 25	20 43	14 2 10	20 40	
xiii. 8.	15	D		8 7	15 3 26	20 55	15 3 11	20 52	
	16	E		8 4	16 4 27	21 6	16 4 12	21 4	
	17	F	Hugh.	8 2	17 5 28	21 17	17 5 13	21 15	
5. iii.	18	G		8 0	18 6 29	22 28	18 6 14	21 26	
xi. 9.	19	A		7 57	19 7 30	21 38	19 7 15	21 36	
	20	B	Edmund.	7 54	20 8 31	21 48	20 8 16	21 46	
4. xix.	21	C		7 51	21 9 32	21 58	21 9 17	21 55	
viii. 5.	22	D	Cicily.	7 49	22 10 33	22 7	22 10 18	22 4	
	23	E	Clement.	7 37	23 11 34	22 15	23 11 19	22 13	
11. xvi.	24	F		7 45	24 12 35	22 23	24 12 20	22 21	
	25	G	Kather.	7 43	25 13 37	22 31	25 13 22	22 29	
10. v.	26	A		7 40	26 14 38	22 38	26 14 23	22 36	
xiii. 8.	27	B		7 38	27 15 39	22 45	27 15 24	22 43	
	28	C		7 37	28 16 40	22 51	28 16 25	22 50	
j. 12.	29	D	Fast.	7 36	29 17 41	22 57	29 17 26	22 56	
2. x.	30	E	Andrew.	7 30	30 18 43	23 3	30 18 27	23 1	

of the Sunne.

☉ in ♏ third yeere				South Declination.	☉ in ♐ Leape yeere			
	D.	M.	D.	M.		D.	M.	D.	M.
1	18	45	17	28	1	19	31	17	40
2	19	46	17	44	2	20	31	17	57
3	20	46	18	1	3	21	32	18	13
4	21	47	18	17	4	22	33	18	28
5	22	48	18	32	5	23	34	18	44
6	23	48	18	47	6	24	34	18	59
7	24	49	19	2	7	25	35	19	13
8	25	50	19	17	8	26	36	19	28
9	26	51	19	31	9	27	37	19	42
10	27	52	19	45	10	28	38	19	56
11	28	52	19	59	11	29	39	20	9
12	29	53	20	12	12	♐	40	20	22
13	♐	54	20	25	13	1	41	20	34
14	1	55	20	37	14	2	42	20	46
15	2	56	20	49	15	3	42	20	58
16	3	57	21	1	16	4	43	21	9
17	4	58	21	12	17	5	44	21	20
18	5	59	21	23	18	6	45	21	31
19	7	0	21	33	19	7	46	21	41
20	8	1	21	43	20	8	47	21	51
21	9	2	21	53	21	9	49	22	0
22	10	3	22	2	22	10	50	22	9
23	11	4	22	11	23	11	51	22	17
24	12	6	22	19	24	12	52	22	25
25	13	7	22	27	25	13	53	22	33
26	14	8	22	35	26	14	54	22	40
27	15	9	22	42	27	15	55	22	47
28	16	10	22	48	28	16	56	22	53
29	17	11	22	54	29	17	57	22	50
30	18	13	23	0	30	18	58	23	4

Certaine Starres neere vnto the South Pole, with their distance from the said Pole, and right Ascension.

1.

The Southermost Starre in the South triangle, is a starre of the third bignesse, distant from the South Pole, 11. degr. 30. minutes, right ascension 9. houres.

2.

The Southermost of the Crosiers, is a starre of the second bigues, distant 22. degrées 30. minutes right ascension 12. minutes.

3.

In the Northwest angle of the South triangle, is a Starre of the second bignes, distant from the Pole, 27. degrees 25. minutes right ascension 8. houres 4. minutes.

December hath 31. dayes.

The Prime				Leng. of the day.	True Place and Declination ☉ in ♐ First yeere.		South Declination.	☉ in ♐ second yeere.	
				H. M.	D. M.	D. M.		D. M.	D. M.
xviii. 5.	1	F		7 34	1 19 44	23 8		1 19 29	23 6
	2	G		7 33	2 20 45	23 12		2 20 30	23 11
9. vii.	3	A		7 32	3 21 46	23 16		3 21 31	23 15
xv. 4.	4	B		7 31	4 22 47	23 20		4 22 33	23 19
	5	C		7 30	5 23 48	23 23		5 23 34	23 22
	6	D		7 30	6 24 50	23 25		6 24 35	23 25
10. iiii.	7	E		7 30	7 25 51	23 28		7 25 36	23 27
xii. 7.	8	F	Con. M.	7 30	8 26 52	23 29		8 26 38	23 29
	9	G		7 30	9 27 54	23 30		9 27 39	23 30
2. j.	10	A		7 30	10 28 55	23 31		10 28 40	23 31
ix. 7.	11	B		7 30	11 29 56	23 31		11 29 42	23 31
xvii. 15.	12	C		7 30	12 ♑ 57	23 31		12 ♑ 43	23 31
vi. 9.	13	D	Lucie.	7 30	13 1 59	23 31		13 1 44	23 31
	14	E		7 31	14 3 0	23 29		14 2 45	23 30
xiiii. 3.	15	F		7 32	15 4 2	23 28		15 3 47	23 28
	16	G		7 33	16 5 3	23 26		16 4 48	23 26
iii. 11.	17	A		7 34	17 6 4	23 23		17 5 49	23 24
	18	B		7 35	18 7 6	23 20		18 6 51	23 21
xi.	19	C		7 36	19 8 7	23 17		19 7 52	23 17
xix. 8.	20	D	Fast.	7 37	20 9 8	23 13		20 8 53	23 14
	21	E	S. Thom.	7 38	21 10 10	23 8		21 9 55	23 9
8. viii.	22	F		7 39	22 11 11	23 3		22 10 56	23 4
xvi. 3.	23	G		7 40	23 12 12	22 58		23 11 57	22 59
	24	A		7 41	24 13 14	22 52		24 12 58	22 53
v. 10.	25	B	Christm.	7 42	25 14 15	22 46		25 14 0	22 47
	26	C	S. Steph.	7 43	26 15 16	22 39		26 15 2	22 40
xiii. 3.	27	D	S. Iohn.	7 44	27 16 18	22 32		27 16 3	22 33
ii. 1.	28	E	Innocent	7 45	28 17 19	22 24		28 17 4	22 26
x. 9.	29	F		7 48	29 18 20	22 16		29 18 6	22 18
	30	G		7 49	30 19 22	22 7		30 19 7	22 9
7. xviii.	31	A		7 50	31 20 23	21 58		31 20 8	22 0

of the Sunne.

	☉ in ♐ third yeere.		☉ in ♐ Leape yeere.		
	D. M.	D. M.		D. M.	D. M.
1	19 14	23 5	1	20 0	23 9
2	20 15	23 10	2	21 1	23 13
3	21 16	23 14	3	22 3	23 17
4	22 18	23 18	4	23 4	23 21
5	23 19	23 21	5	24 6	23 24
6	24 20	23 24	6	25 7	23 26
7	25 22	23 27	7	26 8	23 28
8	26 23	23 29	8	27 9	23 30
9	27 24	23 30	9	28 11	23 31
10	28 26	23 31	10	29 12	23 31
11	29 27	23 31	11	♑ 13	23 31
12	♑ 28	23 31	12	1 15	23 31
13	1 30	23 31	13	2 16	23 30
14	2 31	23 30	14	3 17	23 29
15	3 32	23 29	15	4 19	23 27
16	4 34	23 27	16	5 20	23 25
17	5 35	23 24	17	6 21	23 22
18	6 36	23 22	18	7 23	23 19
19	7 38	23 18	19	8 24	23 15
20	8 39	23 14	20	9 25	23 11
21	9 40	23 10	21	10 27	23 7
22	10 42	23 6	22	11 28	23 2
23	11 43	23 0	23	12 29	22 56
24	12 44	22 55	24	13 31	22 50
25	13 46	22 49	25	14 32	22 45
26	14 47	22 42	26	15 33	22 37
27	15 48	22 35	27	16 34	22 30
28	16 50	22 28	28	17 36	22 22
29	17 51	22 20	29	18 37	22 14
30	18 52	22 12	30	19 38	22 5
31	19 53	22 3	31	20 40	21 56

South Declination.

4.

The fore-foote of the Centaur of the ſecond bignes, diſtant 29. degrées 54. minutes right aſcention 14. houres, 44 minutes.

5.

Centaurs thigh of the ſecond bignes, diſtant 40. degrées 30. minutes right aſcenſion 11. houres, 54. minutes.

6.

Canopus in Argo navis, of the firſt bignes, diſtant from the South Pole, 38. degrées 10. minutes right aſcenſion 6. houres, 20. minutes.

7.

The laſt of Eridanus, of the firſt bigneſſe, diſtant 50. degrées, right aſcention 3. houres.

How to vſe theſe Starres, for the time of their being vpon the Meridian, and conſequently to finde the height of the Pole or Latitude by them, followes afterward.

	♈ ♎		♉ ♏		♊ ♐	
	D.	M.	D.	M.	D.	M.
0	0	0	11	30	20	12	30
1	0	24	11	51	20	25	29
2	0	48	12	12	20	37	28
3	1	12	12	33	20	49	27
4	1	35	12	53	21	0	26
5	2	0	13	13	21	11	25
6	2	23	13	33	21	22	24
7	2	47	13	53	21	33	23
8	3	11	14	13	21	42	22
9	3	35	14	32	21	51	21
10	3	58	14	51	22	0	20
11	4	22	15	10	22	9	19
12	4	45	15	28	22	17	18
13	5	9	15	47	22	25	17
14	5	32	16	5	22	32	16
15	5	55	16	23	22	39	15
16	6	19	16	40	22	46	14
17	6	42	16	57	22	52	13
18	7	5	17	14	22	57	12
19	7	28	17	31	23	3	11
20	7	50	17	47	23	7	10
21	8	13	18	3	23	12	9
22	8	35	18	19	23	15	8
23	8	58	18	34	23	19	7
24	9	20	18	49	23	22	6
25	9	42	19	4	23	24	5
26	10	4	19	18	23	26	4
27	10	26	19	32	23	28	3
28	10	47	19	46	23	29	2
29	11	9	19	59	23	30	1
30	11	30	20	12	23	30	0
	♍ ♓		♌ ♒		♋ ♑		

THis Table sheweth the Declination of the Sunne vpon euery seuerall degree of the Ecliptick through all the foure quarters of the Zodiacke: by which Table you may make tryall of the former Table of Declination, if you doubt of any part thereof, as followeth:

First, by the Kalender or Ephemerides next before, finde out the day of the Moneth, for which you desire the Declination, & right against the same you shall haue the signe, degree and minute, which the Sunne possesseth in the Zodiacke the day aforesaid, with which signe and degree, enter this Table, and marke whether your signe be at the head of the Table, or at the foote thereof, for if the signe be at the Head, then you must count the degr. thereof downeward, in the first Colume at the left hand of the Table, but if the signe be at the foote of the Table, you must count the degree thereof vpward, in the first Colume on the right hand: and in the common angle, where the Characters of the signe and degree thereof meetes, is the degree and minutes of Declination desired.

Example.

The 20. of Aprill 1630. the place of the Sunne is 10. degrees of Taurus, I finde Taurus in the head of the Table, therefore counting 10. degrees thereof downe-

downward in the first Colume on the left hand, right against 10. in the Colume where Taurus stands, is 14. degrées 51. minutes, which is the Declination of 10. degrées of Taurus, or if the Sun, being in so many degrées of the same signe. But if the place of the Sunne haue odde minutes therewith, you muſt take the difference of the two nereſt degrées of Declination, and worke by the proportionall parts of 60. minutes to a degrée.

As for Example.

The 22. of August 1631. the true place of the Sunne is 8. degrées 27. minutes of Virgo, I finde Virgo to be in the set of the Table, therefore in the first Colume on the right hand, I count vpwards 8. degrées, and right against the same in the Colume where the Character of Virgo is, I finde 8. deg. 35. min. which is the Declination of 8. degrées of Virgo, but now there is the declination of 27. minutes to be either addes or deducted, as the declination doth increase or decreaſe. To find which, I take the difference betwixt 8. degr. 35. min. the declination of 8. degrées of Virgo, and 8. deg. 13. min. the declination of 9. degrées of Virgo, which is 22. minutes. Then I say, if 60. min. giue 22. minutes, what giues 27. min. Facit 10. min. nereſt: which because the Declination doth decreaſe, I deduct 10. minutes from 8. degrées 35. min. and the remainer is 8. degr. 26. minutes, for the true Declination of 8. deg. 27. min. of Virgo.

Againe, the 16. of Aprill 1632. the true place of the Sunne is 6. degr. 38. minutes of Taurus. I finde Taurus in the head of the Table, then counting 6. degrées downeward in the first Colume on the left hand, right against the same vnder Taurus, is 13. degr. 33. min. for the declination of 6. degr. of Taurus: then for the 38. min. I take the difference betwixt 13. deg. 33. min. and 13. 53. min. the declination of 7. deg. of Taurus: which is 20. min. then I say, If 60. giue 20. what giues 33. Facit 13. min. neereſt which 13. min. I adde to 13. deg. 33. minutes, because the Declination doth increaſe and it makes 13. deg. 47 min. for the true declination of 6. deg. 38. minutes of Taurus. These three Examples (to the ingenious) are as good as fiue hundreth.

The

The diuiſion, parts, order, and explanation of the former Almanacke or Ephemerides.

The firſt Page of the ſaid Ephemerides, containes an Almanacke for 24. yéres to come, ſhewing the Prime, Epact, Sunday letter, Leape yére, with all the principall moueable Feaſts in the whole yére. Next followes the Twelue moneths of the yére in order, each Moneth containing two Faces, which two faces may be deuided into thrée principall Sections: The firſt Common, the ſecond and third Aſtronomicall: the firſt being indéed the common, becauſe it is moſt néedfull for all perſons, conſiſteth of fiue Columes or ſpaces: The firſt day whereof ſheweth the ſpace and houre of the Mones Change for 19. yéres to come: the ſecond ſheweth the Number of the Dayes in euery moneth: the third, the Letters ordinary for euery Day of the Wéeke: the fourth, the Holy-dayes and other Dayes of note in each moneth. Where note, that thoſe that are obſerued for Holy-dayes, haue this word Faſt. before them, and the Firſt or laſt of the ſaid firſt ſection, ſheweth the Length of the Day in houres and minutes, where the Pole is elenated 51. degrées 40. minutes.

The ſecond Section, containeth foure principall Parts, each part conſiſting of thrée Columes, the foure parts being foure ſeuerall yéres, each fourth yére being Leape yére, therein comprizing the variety of the Sunnes courſe through the Zodiacke in the ſaid foure yéres. And the thrée ſpaces or Columes in each yére; the firſt, is the Dayes of each moneth in the ſaid yére: the ſecond, the True place of the Sunne anſwerable thereto: the third, the Declination or diſtance of the Sunne from the Equinoctiall points of Aries and Libra, toward the Tropicall points of Cancer and Capricorne, anſwerable to each day of the moneth, and to the degrées and minutes of the Sunne in the Zodiacke.

The

The reason wherefore the said Table is made for foure yéres and neyther more nor lesse, is; because that euery yére is not of like equalitie of Dayes one with another: For the first yére hath 365. dayes and néere 6. houres: the second and third yéres being so likewise, but in the fourth yére the odde houres are vnited together, which being 4. times 6. is 24. houres very néere, making a naturall Day, which day is added to the said fourth yére, whereby the said fourth yére is called Leape yére, because it hath one day more then the primary or fore-going yéres.

And so this Table being made for foure yéres, would serue for a long time, were it not that the said fourth yére is not just 366. dayes, but wants 20. minutes or the $\frac{1}{3}$. of an houre, or if there were a just equality made of the dayes of the yéres, with the progresse of the Sunne through the Zodiacke, then this Table would serue for a long time without correction: but only the Zodiacke, with the whole eight Spheares hath a certaine retrograde motion or going backward, yet so vnsensibly, that these Tables being gathered and calculated out of the best and truest Ephemerides for the yéres 1629. 1630. 1631. 1632. according to the true place and dayly motion of the Sun there exactly gathered, I make no question but that they will very well serue for 20. yéres at the least, the difference of the Sunnes place euery 5. yére is so small, being not much aboue 30. seconds or halfe a minute, which in 20. yéres being 5. Bessextels or Leape yéres, makes 2. minutes 30. seconds: a small matter to make any difference in the Sunnes declination.

Notwithstanding which small errour that can grow in so long a time, I thinke it not amisse for the satisfying of these ingenious spirits, which desire perfection, in there worke, to adde this one rule for there further satisfaction, that after these Foure yeeres are past, for which the said former Tables are exactly and truely calculated, to know precisely the true place of the Sunne, for any other foure yeeres afterward, doe thus: Subtract 1620. from the date of the yeere in which you would know the true place of the Sun, the remainer whereof deuided by 4. that which remaines vpon the said deuision, shewes which of the 4. yeeres

in

in the former Kalender serueth to shew the Sunnes place for the yére proposed, and if nothing remaine after the Diuision, then the last of the yéres being the fourth in number, is your yére desired: which knowne, to make an equation of the Sunnes true place, marke how many Vnities are in your Quotient, for so many minutes must be added to the Sunnes place in the said yére formerly found for euery day in the Moneths of May, Iune, Iuly, August, September, and October, and halfe of so many minutes in the other Moneths.

As for Example.

I would know the true place of the Sunne the 15. of August, in the yére 1626. first I subtract 1620. from 1626. and there rests 6. which deuided by 4. brings 1. in the Quotient, and 2. remaines, which 2. shewes that the second of the 4. yéres, answers to the yére desired, & being that there is 1. in the quotient, therefore I must adde 1. minute to the place of the Sunne which is belonging to the day and yére aforesaid, which being that to the 15. of August in the second of the yéres, belongs 1. degrée 55. minutes of Virgo, I adde 1. minute thereto, and the whole 1. degrée 56. minutes is the true place of the Sunne for the day and yére aforesaid, whose Declination answerable thereto, you shall find right against the same in the next Colume towards the right hand, to be 10. degrées 51. minutes.

Againe, the 15. of March, in the yére 1625. I desire the true place of the Sun, therefore subtracting 1620. from 1625. rests 5. which deuided by 4. the Quotient is 1. and the remainer is 1. which remainer being 1. I must seeke for the Sunnes place in the first of the 4. yéres, whose place there I finde for the 15. of March to be 5. degrées 6. minutes of Aries, to which, because the quotient is 1. I adde halfe thereof, which being 30. makes 5. deg. 6. min. and 30. for the Sunnes true place the 15. of March 1625. whose Declination answerable thereto, you shall finde right against the same in the next Colume towards the right hand, to be 2. degrees 2. minutes Northerly.

Wherein thus much is to be noted, that albeit, that in the true place of the Sunne there may be in that time so much difference,

yet

yet in the Declination thereof there can be no sensible difference, for we see, that 3. minutes more or lesse in the true place of the Sunne, doth not produce above a minute difference of Declination, when the Sunnes Declination is swiftest, which is neere vnto the Equinoctiall point, and being neere vnto the Tropickes when the Declination doth increase or decrease very slowly three or foure minutes difference in the Sunnes true place, doth not make any difference in the Declination at all: And therefore by that reason you may be well assured, that these Tables being exactly calculated for the yeares aforesaid, will serue you for a very long time without any sensible errour.

The third section being the last of the second face, containeth the Names, magnitudes, and Declinations of 54. notable fixed Starres, with their right ascension in houres and minutes, most commodious to finde the elevation of the Pole, whose vse followeth afterward.

Propositions to bee wrought by the Ephemerides or Sea-mans Kalender, as followeth.

To know the Moones Change.

1.

TO know the day and houre of Conjunction or Change of the Moone, first, looke in the first page of this Ephemerides, right against the yeere of our Lord, for the Prime number, serving to that yeere, which number keeping in memory, turne to the month in which you desire the Change of the Moone, and in the first Collume of the said month vnder the title Prime, looke for the Prime number which you kept in memory, which Prime numbers are there all in numerall Letters, and right against the said Prime number in the next Collume, is the number of the Day of the Moneth on which the Moone changes: and if there be any figure with

with the Prime number, marke whether it be before or after the said Prime number, for if it bee before, it sheweth the Moone to change so many houres before Noone: if after, it sheweth so many houres after noone: but if there be no Figures at all with the Prime number, then the Moone changes just at Noone.

As for Example.

In the yeare 1628. I would know in June, upon what day and houre of the said Moneth the Moone changes: In the first Page being an Almanacke of 24. yeares: for the Prime, Epact, Dominicall Letter, and moueable Feasts, I find the Prime for that yeare to bee xiiij. which keeping in memorie I turne to June, and in the first Colume thereof vnder the Title Prime, among the numerall Letters I seeke for xiiij. which I find right against the 21. day of the Moneth, thus xiiij. with no Figure after it, which sheweth, that in June 1628. the Moone changes the 21. day, just at Noone.

Againe, in September the same yeare, the Prime xiij. vnder the title Prime in the moneth of September, I finde the Prime aforesaid right against the 17. day of the Moneth, with the figure 2. after it, and further against it in the third Colume, among the Letters for the dayes of the Weeke, is the Letter A. which by reason that F. is the Dominicall or Sunday letter for that yeare, A. stands for Wednesday: So that I conclude, that in September 1628. the Moone did change the 17 day being Wednesday, 2. houres after noone.

Of the Full and Quarters of the Moone.

2.

The next thing to bee considered herein, is the first Quarter of the Full Moone, and the last Quarter thereof, which is thus done; To the time of her change, adde 7. dayes and 6. houres, sheweth the first Quarter, that doubled shewes the Oppolition or Full: and thereto againe the said 7. dayes, 6. houres added, makes the time of the last Quarter.

To

To know what Signe the Moone is in.

3.

A third thing needfull to be knowne, is in what Signe the Moone is at all times, which may thus be done: vpon the Change day next before your day required, looke in the second section of the Ephemerides vnder the yeare desired, and the Colume of the place of the Sunne for the day and yeare, what Signe and degree thereof the Sunne was in vpon the said day of the Coniunction, for then were the Sunne and Moone both in one signe and degree, and to know what signe she is in any day after, multiply her age by 12. which is the meane motion of the Moone: and from the day of the coniunction, in the Colume of the true place of the Sunne, tell forward, if the number bee so great, out of the Moneth to the next, till you haue told the number of the Product of the Moones age, multiplyed by 12. and where the said product number ends, is the signe and degree of the Moone.

Example.

The 16. of October 1629 I desire the same, in which Moneth by the first Proposition I find the Moone to change the 6. day iust at Noone, and being that 1629. is the first yeare, after the Leape yeare, in October vnder the title First yeare, I seeke the 6. day in the first Colume thereof, and right against it toward the right hand is 23. deg. 9. min. of ♎, in which signe and deg. both the ☉, and ☽. were at their ☌ or change, then counting from the said 6. day to the 16. day is 10. dayes for the Moones age, but for her true place, according to your rule before directed vnto you, I count forward from the 6. day of ☌. to 10. more, which being 10. times 12. or 120. the said number of 120. ends vpon the 3. of February, against which is in the next Colume of the Sunnes true place 25. deg. 11. min. of ♒. Therefore I conclude the Moone to bee in 25. deg. 11. min. of ♒. the day and time proposed: otherwise, if you multiply the Moones age by 2. and diuide the Product by 5. the Quotient shewes the whole signe, and the remainer so many times 6. degrees as the Moone is gone from that place of the Zodiacke where she was in the Coniunction.

The

The Moones comming to the Meridian, with the time of her rising and setting.

Multiply the Moones age by 12. and deuide the Product by 15. the Quotient sheweth the houre of the Moones being South, and if any thing remaine after the diuision, for euery vnity that remaines adde 4. minutes, because 15. degrées make an houre of time, and 4 minutes a degrée. That knowne, learne by the third Proposition what signe the Moone is in, and then looke out in the second section, what time and Day of the yéere the Sunne possessèth the same Signe and Degrée thereof, and right against the said Day in the last Colume of the first section, vnder the Title Length of the Day, is the length of the day, the Sunne being in the same Signe in houres and minutes: halfe that number of the dayes length taken from the time of the Moones being South, sheweth her rising, and the said halfe added to the time of her being South, sheweth her setting.

Example.

The 16. of October 1629. I find the Moone to Change the 6. day at Noone, and the number of dayes betwixt that and the 16. day is 10. for the Moones age, then multiplying 10. the Moones age by 12. her meane motion, the Product being 120. deuided by 15 the degr. answering to an houre of time, the Quotient is 8. which shewes the Moone to be vpon the Meridian or at South at 8. of the clocke that Night; then by the third Proposition or former example, I finde the Moone to be in 25. degrées 11. min. of Aquarius, and the Sunne being in the same signe, deg. and min. the Diurnall arch or length of the Day being then 9. houres, 37. minutes, is the continuance of the Moone likewise, in her cyther Diurnall or Nocturnall arch, the ½. thereof taken from her being vpon the Meridian, leaueth her rising; and likewise the other halfe added to the time of her being vpon the Meridian, sheweth her

her setting. Thus you see that the day and yere aforesaid, the Moone shall here in our Horizon, rise at 4. a clocke after noone: she shall be South, or upon the Meridian, at 8. a clocke after noone: she shall set at 12. a clocke at night: and her continuance about the Horizon, or her shining to vs is 8. houres.

This is a very necessary thing to be knowne, for by her being upon any other poynt of the Compasse, you may giue a very neere ghesse, at euery houre of the night.

The next thing to be considered in the first section, is the Festiuall dayes, and other dayes of note, which are so common, that they neede no explanation. Onely this: before euery Feast which is kept Holiday, is set this word Fast.

To know the length of the Day, or the length of the Night, with the rising and setting of the Sunne.

5.

All this is performed by the last Columne of the first section thus: Right against the Day of the month desired in the last Columne of the said first section, vnder the Title Length of the Day, is the length of the day desired, in houres and min. which number subtracted from 24. the length of the natural day, leaues the length of ỳ night: and halfe the said number taken from noone, leaues the houre of the Suns rising: the other halfe of the day added to noone, sheweth the Sunnes setting.

Example.

The 19. of October in the yere 1631. vnder the Title Length of the Day, right against the said 19. day, is 9. hour. 36. min. the length of the day, which 9. hou. 36. min. taken from 24. hou. leaues 14. hou. 24. min. for the length of the night: Then the halfe of 9 houres 36. min. which is 4. hou. 48. min. taken from noone. leaues 7. houres 12. min. for the sun rising. The same 4. houres 48. min. added to noone: makes 16. hou. 48 min. which is 4. houres. 48. minutes after noone.

By which you ſée that the 19. of October, the length of the day, is 9. houres 36. min. the length of the night 14. houres 24. minutes: the Sunne riſeth 12. minutes after 7. in the morning, and ſetteth 48. min. after 4. in the euening.

Thus much for the firſt ſection: the ſecond ſection being foure parts ſeruing for foure ſeuerall yéeres, euery part hauing thrée Columes: the firſt the day of the moneth, the ſecond the true place of the Sunne, and the third the Declination of the Sunne agréeing thereto, all the thrée parts being of like quality, which are ſo plaine and commonly knowne, that they néede no further diſtiaction, albeit that the vſes thereof are manifold, and commodities excellent: For there are few propoſitions concerning the Spheare, which can be wrought without the true place of the Sun knowne, and being ſo much vſe for it, there are few meanes for the true knowledge thereof, but onely by the Ephemerides, which euery one cannot haue.

And for that cauſe I haue transferred the true place of the Sun in degrées and minutes, out of the beſt Ephemerides into this former Kalender, where it is ready for ſuch as deſire the ſame, or as haue occaſion to vſe the ſame, in working concluſions, or making of Inſtruments Mathematicall: but moſt chiefly I haue here placed it, to the end that thoſe that ſtand in doubt of the trueth of thoſe Tables of the Sunnes Declination, may at their owne pleaſure make tryall thereof: The order how to doe the ſame, is ſet downe in the firſt printed page after the ſaid Tables: for by the true place of the Sunne, is found his Declination, either North or South: and by his Declination and obſeruation of the Sunnes Altitude vpon the Meridian, is knowne the height of the Pole or Latitude of the place where you are.

How to vſe the Sunnes Declination, thereby to find out the eleuation of the Pole.

6.

To finde out the Altitude or height of the Poles, in any ſeuerall

uerall Latitude, viz. How much the Pole is raised abone your Horizon in degrées and minutes. It is necessary first to take by obseruation, the Meridian Altitude of the Sunne, which Meridian Altitude is knowne, by taking the height of the Sunne, that day, in which you would obserue, iust at nœne: at which time the Sunne is highest, being then also vpon the Meridian: which found, note it downe in paper or slate: Then knowing the yéere of our Lord, with the Month in which you are, and also the day of the Month, loke in the Kalendar before spoken of, for the Month and day thereof, and right against the said day of the month toward the right hand, vnder title Declination of the Sunne, you shall see the seuerall yéeres, which the said Tables of Declination serue for. If it be the Leape yéere, loke in the last of the said foure Tables, vnder the Title Leape yeere: If it be the first yéere after the Leape yéere, then resort to the first of the said Tables vnder the title First: and so of the second and third, and after those 4. yéeres are past, come backe againe to the first, & proceed as you did before: then (as I said) hauing found out the month, day, and yéere, direct your eye downeward toward the foote of the Table, in that Table which serues to the yéere proposed, till you find a number making a right angle, with the day of your month: or more plainely, loke what number in the last Columne of your yéere, is right against the day of your month: which numbers are the declination for the day desired: and being 2. numbers in the said Columne, the first are deg. the other minutes: then regard also, whether the Sunne hath N. declination or S. declination, which is set downe betwéene the seuerall spaces: where by the way you shall note, that from the Suns entrance into Aries, which is the 11. of March, till his entrance into Libra, the 13. of September, he hath N. declination: and from the said 13. of September till his entrance into Aries againe, S. Declination: the said declination increasing according to the Sunnes progresse through the signes, from his entrance into Aries, till his entrance into Cancer, and decreasing from Cancer, to the beginning of Libra. Then again increasing from Libra to Capricorne, and decreasing from Capricorne to the end of Pisces, and beginning of Aries. Aries, Taurus, Gemini, Cancer, Leo, and Virgo, being signes hauing North decli-

nation from the Equinoctial Circle: and Libra, Scorpio, Sagitarius, Capricornus, Aquarius and Piſces. South ſignes having South declination from the Circle: then knowing (as I haue ſaid) the Meridian Altitude of the Sunne, the Declination of the Sun, and whether the Sunne hath South or North Declination, as theſe three things are alwayes to be conſidered, in knowing the height of the Pole. If the Declination be North, ſubtract the Declination from the Meridian Altitude, the remainer is the Eleuation of the interſection or cutting of the Equinoctiall with the Meridian aboue the Horizon, which in common tearmes is the Eleuation of the Equinoctiall aboue the Horizon: which height of the Equinoctiall, taken from 90. leaueth the height of the Pole, or the Latitude of the place of your obſeruation. But contrarywiſe, if the Sunne hath South Declination, adde the ſaid Declination to the Meridian Altitude, the product is the height of the Equinoctiall, which likewiſe taken from 90. leaueth alſo the height of the Pole.

Example

I obſerued the 11. of July 1628. in the City of London, and found the Meridian Altitude of the Sunne to be 58. degrées, 56. minutes, and the Declination of the ſunne North 20. degrées 28. minutes: Being that the Declination was North, I ſubtracted 20. deg. 28. min. the Declination of the Sunne at noone: the remainer was 38. deg. 28. min. the height of the Equinoctiall: that taken from 90. leaues 51. deg. 32. min. for the height of the Pole, or Latitude of London.

This rule is to be vnderſtood, when you are betweene the Equinoctiall and the North Pole, and the Sunne to be Southward off you: But if you ſhould be betweene the Equinoctial and the South Pole, and the Sun North from you, then you muſt worke contrary: for then if the Sunne hath South Declination, you muſt ſubtract the Declination from the Meridian Altitude, and if the Sun hath North Declination, you muſt adde the ſaid Declination to the Meridian Altitude.

For

For Example.

Being at Sea to the Southwards of the Line, the 4. of January 1628. suppose that you obserue the height of the Sunne at noone, and find it to be 66. deg. 20. min. then you shall find the Declination to be 21. de. 24. min. to the Southwards, which subtracted from 66. de. 20. min. the Meridian Altitude leaues 44. deg. 56. min. for the height of the Equinoctiall: that taken from 90. rests 45. deg. 4. minutes, for the height of the South Pole aboue the Horizon.

Againe, suppose that being at sea, the 10. of May 1628. and obseruing the Sunne, you take the Altitude at noone 60. deg. 30. min. and his Declination then is 20. deg. 10. min. Northwards but then not hauing obserued long before, you know not whether you are to the Northwards of the Equinoctiall, or to the Southward of the said Line: to know which, set the Sun by your Compasse, and marke which way the shadow of the Sun straketh: for if he caſteth his shadow the same way that the Declination is, then is the Sun betwixt the Equinoctiall and you. Your selfe being also the same way that the Sunnes Declination is: and therefore subtracting the Declination 20. deg. 10. min. from 60. deg. 30. min. the Meridian Altitude: rests 40. d. 20. min. the height of the Equinoctiall, the complement whereof 49. degrées. 40. min. is the elenation of the North Pole: but if the Sun caſts his shadow contrary to his Declination, that is to say: If hauing North Declination, his shadow goeth Southward, or hauing South declination, caſts his shadow Northward: Then either the Equinoctiall shall be betwixt you and the Sunne, or you in the Equinoctiall: or else you shall be betwixt the Equinoctiall and the Sunne: which to know, adde the Declination and the Meridian Altitude for the day proposed together: If the summe of the addition be leſſe then 90. degrées, so much as it wanteth of 90. degrées, shall you be distant from the Equinoctiall, that way which the shadow straketh: If it be iuſt 90. deg. then are you vnder the Equinoctiall. Againe, if your said Meridian Altitude and Declination added passeth 90. degrées, then so much as is ouer-plus, shall you be from the Equinoctiall towards the

Sunne, and then also you shall be betwixt the Equinoctiall and the Sunne, and if you find the Sunne to be in your Zenith, so much as is the declination shall you be from the Equinoctiall, that way that the Sunne declineth: By which reason, if the Sunne bee in your Zenith, that is 90. deg. high, and hath no Declination, then are you under the Equinoctiall.

How to appropriate the Tables of Declination to any other Meridian.

There is in the vſing of the Sunnes Declination, one principall thing to be considered: which is, that a Table of Declination made for any particular place, doth not serue generally for all places, but onely for such places as haue the like, or neere the same Longit: The reason is, because that the Declination is calculated according to the true place of the Sunne at noone, at which time the Sunne is vpon the Meridian at that place for which the said tables are made: But you muſt note that the Sunne doth not come to the Meridian in all places at a like time, although that in all places the Sunne being vpon the Meridian, makes the middle of the day. But for euery 15. deg. difference of Longit. betweene any two places, the Sun comes sooner or later to the Meridian by so many houres. For if the place of 15. deg. to the Eaſtward of the place prefixed, then the Sun comes sooner to the Meridian by an houre, and if it be 15. deg. to the Weſtward later by an houre. And so consequently more or leſſe, according to the difference of Longit. By which reason, in what part of the world soeuer you be, you may worke for the Declination of the Sunne in that place, by the proportionall parts of 24. houres Declination, to the houre of difference in Longitude.

As for Example.

Being in Braſilia (a part of the West Indies) the 10. of Aprill, this yeere 1628. whose Meridian is distant from the Meridian of England, to the Weſtward about 45. deg which is 3. houres of time that the Sunne should come to the Meridian later there then here at London where the Table is made: For when it is 12. a clocke here, it is but 9. there, and being noone there, it is 3. a clocke here.

Therefore

Therefore to apply this Table to that place, I finde the Declination for the day aforesaid, under our Meridian to be 11. degr. 43. min. at noone, and by reason that when it is 12. a clocke at Brasilia, it is then at London 3. houres past. Therefore by the rule of proportion, I seeke what declination the sun hath at 3. a clocke afternoone, as followeth. I take the difference of declination betweene the day aforesaid, and the next following, which is 20. min. then I say by the rule of 3. if 24. houres giue 20. min. what giues 3. houres, the time of the difference of Longit. Facit 2. min. and 30. seconds, which (because the declination increases) I adde to the number of the day proposed: so I conclude the declination of the Sunne to be the 10. of Aprill at noone, in the Kingdome of Brasilia, 11. degrées, 45. minutes and ½.

Againe the day and time aforesaid, in the Bay of St. Sebastian, whose Longit. is 58 degrées to the Eastward of London, answering neere to 4. houres of time, shewing that the Sun comes sooner to the Meridian in the Bay of St. Sebastian, by 4. houres then at London: by which reason the declin. is lesse there, then at London, because the declination doth increase: For if the declination did decrease, it would be more there then at London: and to know the declination of the Sunne in the Bay aforesaid: I take the difference betwixt the declination of the 10. of Aprill, & the declination of the day next before, being 20. min. Then (I say) if 24. houres giues 20. min. what 4. houres Facit 3. min. which deducted from 11. deg. 43. min. the declination of the Sunne the 10. of Aprill aforesaid at London, leaueth 11. deg 40. min. The declination of the Sunne at noone: in the Bay of Saint Sebastian, being that when it is 12. of the clock there, it is but 8. a clocke at London: or in any place hauing the same Longitude.

How to obserue the height of the Pole by the Starres.

THe working hereof by the Starres, to find the height of the Pole, is all alike with the working thereof by the Sunne: for if you obserue any Starre vpon the Meridian, loke in the third

or laſt ſection of the Ephemerides, amongſt the Poneths for the name of the Starre which you obſerued, wherewith you ſhall find his Declination either N. or S. and the right aſcention thereof in houres and min. and hauing taken the Altitude of any Starre vpon the Peridian, you haue nothing to marke in the Table for this but the Declination, which if it be North take the Declination of the Starre from the height thereof: The remainer taken from 90. leaueth the height of the Pole: but if the Starre hath South Declination, adde the Declination to the Altitude taken, and the Product thereof taken from 9. leaues the height of the Pole: Alſo to find the time of any Starres comming to the Peridian, is ſet downe after the Tables of the Sunnes right aſcention.

Example.

The 25. of Nouember 1618. I obſerued a Starre of the ſecond bignes in the ſhoulder of Pegaſus, or the Flying-horſe, about 8. of the clocke in the Euening, and found the Peridian Altitude thereof to be 51. deg. 26. min. and in the Kalender, in the ſecond Face thereof, I find the ſaid Starre to haue 12. deg. 58 min. North Declination: which taken from 51. deg. 26. min. the height obſerued leaues 38. deg. 28. min the height of the Equinoctiall: the complement whereof 51. deg. 32. min. is the height of the North Pole at London.

And ſo conſequently for all thoſe Starres whoſe Declination is taken from the Equinoctiall: but for thoſe Starres which are any thing neere to the Pole, whoſe diſtance or Declination is counted from the Pole, their working is thus: You muſt note, that being any thing farre to the Northward, ſome of thoſe Starres will be twice vpon the Peridian, viz. once aboue the Pole, and once vnder the Pole: Therefore if you obſerue any Starre vpon the Peridian vnder the Pole, adde the diſtance of the ſaid Starre from the Pole to your Altitude obſerued, the totall is the height of the Pole: But if you obſerue any Starre vpon the Meridian aboue the Pole, ſo much as is the diſtance or Declination of the ſaid Starre from the Pole, you muſt take from the Altitude taken, the remainer is the height of the Pole.

As for Example.

If at London you obſerue the former Guard Starre beneath the Pole vpon the Meridian, you ſhall find it to be 37. degrées 21. minutes, to which if you adde 14. degrées 11. minutes, the diſtance of the ſaid Starre from the Pole, the totall is 51. degrées 32. minutes, the height of the North Pole at London. Againe, the ſame Starre obſerued vpon the Meridian aboue the Pole is 65. degrées 43. minutes, from which 14. degrées 11. minutes the diſtance aforeſaid taken, leaueth 51. degrées 32. minutes as before.

Note that being farre Northward, thoſe Starres betwéene the Equinoctiall and the Tropicke of Cancer, are beſt to obſerue, and being betwéene the ſaid Tropicke and the Equinoctiall, thoſe Starres aboue the Pole are fitteſt for obſeruation, and for thoſe that trauaile farre beyond the Line to the Southwards: the like order muſt be kept by the Starres, betwéene the Equinoctiall and the Tropick of Capricornus, and thoſe that are néere the South Pole.

And whereas the North Starre it ſelfe being very néere vnto the Pole, is the fitteſt Starre for to bee obſerued by reaſon of the nærenеſſe thereto, I haue for your further eaſe, made an exact Table for the Declination of the North Starre, from the Diameter of the Poles Circle, deſcribed by the North Starre, which may bée alſo, or rather called the Elevation or depreſſion vpon euery point of the Compaſſe, being very commodious, by reaſon whereas the other Starres are onely to be obſerued vpon the Meridian. This ſaid North Starre by the helpe of this Table following, may bée obſerued at any time of the night, whoſe vſe followeth after the ſaid Table.

This

	Points of the Compasse.		Degrees	Minutes	Of Declination
If the guards be	N.W.b.W.	Then the Load star is	0	0	Vnder the Pole.
	Northwest.		0	34	
	N.W.by N.		1	6	
	N.N.W.		1	36	
	N.by W.		2	4	
	North.		2	24	
	N.by E.		2	40	
	N.N.E.		2	50	
	N.E.by N.		2	52	
	Northeast.		2	50	
	N.E.by E.		2	40	
	E.N.E.		2	24	
	E. by N.		2	4	
	East.		1	37	
	E. by S.		1	6	
	E.S.E.		0	34	
If the guards be	S.E.by E.	Then the Load star is	0	0	Abone the Pole.
	Southeast.		0	34	
	S.E. by S.		1	6	
	S.S.E.		1	36	
	S. by E.		2	4	
	South.		2	24	
	S. by W.		2	40	
	S.S.W.		2	50	
	S.W. by S.		2	52	
	Southwest.		2	50	
	S.W.by W.		2	40	
	W.S.W.		2	24	
	W. by S.		2	-	
	West.		1	36	
	W. by N.		1	6	
	W.N.W.		0	34	

This former Table sheweth how much the North Star is, either abone or beneath the Pole, the Guards being vpon any point of the Compasse.

The vse of which Table is thus: having obserued the Altitude of the North Starre, marke so neere as you may, vpon what point of the Compasse the Guards then are: which knowne, resort to this Table, and finding there in the said point vpon which the Guards were at your obseruation, right against the same is the number of degrees and minutes, which the Starre is either abone or beneath the Pole, which number so found, if it be aboue the Pole, must be subtracted from your Altitude taken, and if vnder the Pole, it must be added to the sayd Altitude taken: which totall added, or remainer subtracted, is the true height of the Pole it selfe.

As

As for Example.

Obſeruing the Northſtarre to be 58. deg. 30. min. when the Guards are at the Northeaſt I looke in the table for the Northeaſt point of the Compaſſe, and right againſt the ſame I find 2. deg. 50. min. vnder the Pole, which being that the Northſtarre is vnder the Pole, I adde his Declination 2. deg. 50. min. to 50. deg. 30. min. his Altitude obſerued, and the totall 61. deg 20. minutes, is the iuſt height of the Pole it ſelfe in that place.

Againe, obſeruing the Northſtarre to bee 50. degrées 15. min. aboue the Horizon, when the Guards are vpon the ſoutheaſt point of the Compaſſe, I looke for ſoutheaſt in the Table, and right againſt the ſame is 34. minutes aboue the Pole, which being that the Starre is then ſo much higher then the Pole it ſelfe, I ſubtract 34. minutes, the Declination of the Starre from 50. deg. 15. min. the Altitude taken and the remainer 49. degrées, 41. minutes, is the perfit height of the Pole aboue the Horizon in the ſaid place of obſeruation.

And now hauing made plaine vnto you the vſe and profite of the ſaid Table, it being indéed ſo neceſſary and commodious for the Mariners vſe, as any rule whatſoeuer, it reſteth now to ſpeake ſomewhat more particularly of the other fixed Starres, ſet downe in the former Kalender or Ephemerides, whoſe vſe is manifold and very excellent, but their vſe for the finding of the Poles eleuation by their Declination, obſerued at their being vpon the Meridian being formerly ſhewed, it is only requiſite to explaine vnto you a briefe and eaſie methode for the exact and ready finding of the true time of any of the fixed Starres comming to the Meridian, at which time they are onely fit for to be obſerued: for the knowledge whereof, I haue here placed a Table of the right aſcention of the Sunne for euery day of each Moneth throughout the whole yéare, according to his true place for euery of the ſaid dayes formerly ſet downe in the Kalender or Ephemerides: the vſe whereof followeth after the ſaid Table.

A Table

A Table of the Sunnes

Dayes.	Ianua.		Febru.		March		Aprill.		May.		Iune.	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
1	19	30	21	39	23	25	1	16	3	11	5	15
2		34		43		28		20		15		19
3		39		47		32		25		19		23
4		43		50		36		29		23		27
5		47		54		40		33		27		31
6		52		58		44		36		30		36
7		56	22	2		47		40		34		40
8	20	0		6		51		43		38		45
9		4		9		55		47		42		49
10		8		14		58		51		46		53
11		13		18	0	2		55		50		57
12		17		21		6		58		54	6	1
13		22		25		9	2	2		58		5
14		26		29		12		6	4	2		9
15		30		32		16		10		7		13
16		34		36		20		14		11		18
17		38		40		23		18		15		22
18		42		44		27		22		19		26
19		46		48		31		26		23		30
20		50		52		35		30		27		34
21		54		56		38		33		31		38
22		58		59		42		37		35		42
23	21	3	23	3		46		41		39		46
24		7		7		49		44		43		51
25		11		10		53		48		47		55
26		15		14		57		52		51		59
27		19		18	1	0		56		56	7	3
28		23		22		3	3	0	5	0		7
29		27				7		4		3		11
30		31				11		7		4		15
31		35				15				11		

right aſcenſion in Houres and Minutes.

Dayes.	Iuly.		Auguſt		Septē		Octob.		Nouē.		Decē.	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
1	7	19	9	22	11	16	13	5	15	5	17	12
2		23		26		20		8		9		17
3		27		30		23		12		13		21
4		31		33		27		16		17		25
5		35		36		30		19		21		30
6		40		40		33		23		25		34
7		44		44		37		27		29		39
8		48		48		41		31		33		43
9		52		52		44		34		37		47
10		56		56		48		38		42		52
11	8	0		59		52		42		46		56
12		4	10	3		55		45		50	18	0
13		8		7		59		49		54		5
14		12		11	12	3		53		58		10
15		16		15		7		57	16	3		14
16		20		18		11	14	1		7		18
17		24		22		14		5		11		23
18		28		26		18		9		16		27
19		31		29		22		13		20		32
20		35		33		25		17		24		36
21		39		36		29		20		28		41
22		43		40		32		24		33		45
23		47		44		36		28		37		50
24		51		47		40		32		41		55
25		55		51		43		36		46		59
26		59		54		47		40		50	19	3
27	9	3		59		51		44		55		7
28		7	11	2		54		48		59		12
29		11		6		58		53	17	3		16
30		15		9	13	2		57		8		21
31		19		13			15	1				25

A Declaration of the former Table.

I Thinke it not amisse, before I shew the vse of the former Table of right ascention, for the finding of the time of any Starres comming to the Meridian, to explaine vnto you what we call right ascention. Know therefore, that in the Sphear there is right ascention, Oblique ascention, and meane ascention, which haue all seuerall definitions: but the rest being impertinent, I will onely speake of right ascention which is thus defined: Right ascention is that portion of the Equinoctiall which commeth to the Meridian, of Nonestread with any Starre, or any part of the Ecliptick: or more plainely, it is that number of degrées of the Equinoctiall, comprised betwixt the Vernall Equinoctiall point, or intersection of the said Equinoctiall Circle, and the first minute of Aries, and that Starre or part of the Ecliptick, which is vpon the Meridian at the day or time desired. As for your better vnderstanding, if the beginning of Aries bee vpon the Meridian, or any point or Starre in the said beginning of Aries, then hath the said point or Starre so situated, no right ascention at all, by reason that the beginning of the Equinoctiall commeth to the Meridian therewith: But if the beginning of Cancer, or any Starre in that situation be vpon the Meridian, then is there with it vnder the same Meridian 90. degrées of the Equinoctiall, or 6. houres of time, being that euery 15. degrées of the equinoctiall answers to one houre of time, shewing that that Starre or point, which is in the beginning of Aries, shall come to the Meridian 6. houres sooner then that other which is in the beginning of Cancer, and so of others: I doubt not but

but that these few words will suffice to giue you the better light to that which followes. First therefore, to finde the right ascention of the Sunne at any time, looke for the Moneth in the head of the Table, & for the day of the Month at the left side of that face, where the Month desired is, and in the common Angle answering to them both: is the houre and minute of the Sunnes right ascention.

As for Example.

I desire the right ascention of the Sun, the 25. of May: first in the head of the Table I looke for May, which found in the first Columne on the left hand, I looke for 25. and right against the same in the common Angle, vnder the title May, I find 4. houres and 47. min. for the right ascention of the Sunne the said 25. of May.

These things thus knowne and considered, it is to be noted, that whereas the Sunne hath a different number for his right ascention euery day, and the starres kéepe euery one still alike number for his peculiar right ascention, the reason thereof is this:

The Starres are all fixed in the eight Spheare, in which eight Spheare is also the Zodiacke placed, not onely to limit the course and progresse of the Sunne in his continuall motion, but also to giue a certaine limitation to the Starres, who being fixed in any part of the Heauens, that certaine Meridian or Circle of South and North, which passeth through the Center of any Starre cutteth also in one place or other of the said Zodiacke: which number of degrées so put in the Zodiacke, is the Longitude or distance of the said Starre from the beginning of Aries: Now the Star (as I said) being so fixed hath no motion, but onely as the whole Frame of the Zodiacke with the right Spheare, and all the Circles and Starres therein placed, which as is apparent to the sight, is by the first mouer carried round about from East to West in 24. houres: but the Naturall motion of the said eight Spheare, being from the West to the East, is so slowe, that it is vnsensible, whereas the Sunne being of a very swift motion, in comparison of the former, his motion being euery 24. houres, kéere vpon a

deg.

degrée litle more or lesse, makes his motion from the W. to the E. in the Zodiack most apparant in his motion, also describing the Zodiacke Circle, as neuer declining from the middle thereof: And further, the Sunne being the ruler of the Day, and director of the Night, is the sole and onely distinguisher of Time: For this is apparent to the view of euery one, that the Sunne being vpon the meridian, aboue the Horizon, makes the middle of the Day, and being vpon the Meridian vnder the Horizon, makes also the middle of the Night: which being (as I haue said) that the Sunne comes alwaies to the meridian iust at 12. a clocke, it followes necessarily, that what Starre or point in the Zodiack soeuer, hath greater Longit. then the Sun, his right ascension is also greater then the Sunnes: and loke how much the said right ascension is more then the Sun, by so much later then the Sunne must the said starre or point come to the said Meridian. Proportionally after 15. degr. to an houre, and 1. degrée to 4. minutes of time.

Take this therefore for a generall rule, that if the right ascension of the Starre, whose time of cõming to the Meridian you desire to know, be greater then the right ascension of the Sun, subtract the Sunnes right ascension from the said starres right ascension, and the remainer (if it be lesse then 12.) is the houre and minute that the Starre comes to the Meridian after noone: and if the remainer be more then 12. subtract 12. also, and the remainer shewes so many houres and min. after midnight: But if the Sunnes right ascension be greater then the Stars right ascension, then adde 24. houres to the stars right ascension, and subtract the Sunnes right ascension therefrom, as before, the remainer shewes the Stars cõming to the Meridian after noone: If it be lesse then 12. or if it be more then 12. 12. also subtract, the remainer showes so many houres and minutes after midnight.

As for Example.

The 15. of November, I desire to know at what time Oculus Tauri (or the Bulls eye) will be vpon the Meridian: first in the former Table of the Sunnes right ascension, I loke for the 15. of

November

November, where I find the Sunnes right ascension for that day to be 16. houres and 3. min. and in the Kalender or Ephemerides among the fixed Starres, I finde the right ascension of the Buls eye to be 4. houres 13. min. which being lesse then the Sunnes right ascension, I adde 24. houres to 4. houres, 13. min. and from the totall 28. houres 13. min. subtracting 16. houres 3. minutes the Sunnes right ascension, rests 12. houres, 10. minutes, which being more then 12. houres, I take away also 12. houres, and so there rests 10. min. after midnight, that Oculus Tauri comes to the Meridian the said 15. of November.

Againe, the 10. of Aprill, I would know at what time the Lyons tayle will be upon the Meridian: In this Table I finde the Sunnes right ascension, the day aforesaid, to be one houre 51. min. and in the Kalender I finds the right ascension of the Lyons tayle to be 11. houres 29. min. When subtracting one houre 51. min. the Sunnes right ascension, from 11. houres 29. minutes the Starres right ascension, rests 9. houres 38. minutes, shewing that 38. min. after 9. a clocke at night, the said Starre shall be upon the Meridian.

The Monethly time of each Starres being in rule for Obseruation.

January.

Oculus Tauri, the whole constellation of Oryon, Hyrcus, the Goat, the great Dog, the little Dog, the greatest part of Leo, the Crosiers, Canopus, and the South Triangle.

February.

The whole Constellation of Leo, Arcturus, the Centaure, and the Virgins Spike.

March.

The hidden part of Leo, Hydra, Virgins Spike, the Centaure, Arcturus, the Balance and Scorpio.

Aprill.

The Centaure, Balance, Scorpion, Lyra, and Sagitarius.

May.

Scorpio, Lyra, South crowne, and Eagles heart.

Iune.

South crowne, Eagles heart, Swans tayle, and the Dolphin.

Iuly.

The Dolphin, Fomahand, and Pegasus shoulder.

August.

Fomahand, Pegasus, Cassiopeia, Andromeda, the Whale, and the Ramme.

September.

Cassiopeia, Andromeda, the Whale, the Ramme, Medusa perseus, and Eridanus.

October.

All the former of September, and October, Oculus Tauri, Orion, Hircus, and the great Dog, the Crosiers, and Canopus.

Nouember.

All the former of October, with Nouember, the little Dog, and the South tryangle.

December.

The Whale, the Ramme, Medusa, Perseus, Eridanus, Oculus Tauri, Hircus, Orion, Canopus, great Dog, little Dog, Hydra, and Leo, in the Moneths aforesaid, at one time or other of the Night, these starres are vpon the Meridian.

Hauing sufficiently explained vnto you the manner and way how both by the Sunne and starres to attaine to the true height of the Pole, or Latitude of any place: I purpose now (God willing) to speake somewhat of the Longitude: which as the former is most easie, and the finding thereof knowne almost to all Seamen, so is the other as vncertaine, and hath not yet hitherto beene found out or knowne exactly to any, albeit that many Learned men and of great experience haue labourd very earnestly for the same, and many good meanes haue they inuented, as helps and assistance vnto Mariners in their long Nauigations and Trauels, by which though with great labour, care and industry, they transport themselues to the vtmost Regions of the world: with farre more ease and facility they might doe it, if they could as perfectly

perfectly and readily finde the Longitude at all times, as they may the Latitude: for then hauing sayled many dayes in vnknowne pathes vpon the large and spacious Seas, and indured all those vnindurable troubles, miseries, and vnspeakeable calamities, which doe for the most part attend vpon Long-voyages: yet after all this, if vpon the first faire opportunity, they could readily with the Latitude, finde also the Longitude, their forepassed troubles would bee ioyfully remedied, being that these two (like louing sisters) would apply such pleasing comfort to their colde stomackes, after their tedious trauels, by giuing them the true pricke or place of their then present being. Peter Appian, and Gemma Frisius, haue written thereof, as also some others: but truely in my opinion, it was neuer brought to such exquisite perfection, as it is now a dayes: and for mee to write thereof, were but as it were to set vp a Candle at noone dayes, rather to shew mine owne folly, then to lighten those that know a better way then my selfe: in which doing, well may Appelles saying, Nec sutor vltra crepidam, be applyed vnto me, but for my excuse I doe intreat the iudicious to perswade themselues, that it is farre from my thought to set downe any thing in this for a president vnto them, but onely in good will to shew my opinion thereof, to the Ignorant, being as followeth.

First, therefore the Latitude being knowne: by finding the Longitude also, you haue the true pricke or place in the Globe, or Carde, where your ship is, which to finde nereſt, is two wayes, one by dead Reckoning, the other by Obseruation: But dead Reckoning (as they call it) being as I take it most vsed, I will speake first thereof, by which if it were possible that this Reckoning could exactly and precisely be kept it would giue both Latitude and Longitude without any obseruation at all: The different Latitude being onely the distance that the Ship is departed from the Paralell where she last was, eyther Northward or Southward: and Longitude being the distance that she is departed from the Meridian, eyther Eastward or Westward: For the knowledge whereof, these things are principally to bee considered.

First, the true pricke or place of the Ships being at the beginding of the voyage.

Secondly, a sound and experimented iudgement of the way that the ship maketh, with euery swift wind.

Thirdly, to know exactly how much the Compasse doth vary from the true North or South poynt, vpon which the Needle is taught, either Eastward or Westward, in as many seuerall places as conueniently may be obserued.

Fourthly, to note diligently the Flouds or Currents, which may cause the Ships way to be more Leeward, or otherwise then expectation, and to giue allowance of her course and way accordingly.

Fiftly, the seuerall points of the Compasse that she makes her course good vpon, and what way she hath made vpon euery point.

Sixtly, to bring those seuerall courses into one straight line, thereby to know what course she hath made good, with the neerest distance vpon the said point or Rombe, that she hath made her way good vpon.

And lastly, knowing how many leagues doth raise or lay a degree vpon the said Rombe, the true reckoning of your said course and distance, giues you the difference of Latitude or Paralell where the Ship then is: and also knowing how many leagues answer to a deg. of E. and W. in the said paralell, the course, distance and Latit. giues the differenee of Longit. or the Meridian, vnder which the Ship then is, the intersection of which said paralell and Meridian is the pricke or place of the Ships then being, of which things I will speake more particularly afterward.

Now it resteth to speake something of knowing the Longitude onely by obseruation, which is very necessary to be knowne, that thereby the one may make tryall of the other, being that if the accompt by dead reckoning, and also by obseruation doe both agree in the Latit. and Longitude, then may you be well assured, that you know truely the place where you then are, which Longitude by obseruation is thus knowne: prepare a very perfect and true running glasse, which may precisely runne 24. houres without error, and about the time that you purpose to set sayle, set the said

glasse

glaſſe a running iuſt at 12. a clocke, when the Sunne is vpon the Meridian: being run out, be ſure to turne the ſaid glaſſe inſtantly as it is out: not loſing any time in the turning it, and ſo having very warily kept the ſaid glaſſe till you thinke good to make an obſeruation, at which time it is requiſite to haue in readineſſe a halfe houre glaſſe, and a minute glaſſe, that if the 24. houre glaſſe be out before the Sunne come to the Meridian, then ſoone as it is out, to turne the halfe houre glaſſe or min. glaſſe as you ſée occaſion, thereby to know preſently how much the 24. houre glaſſe is out before the Sunne comes to the Meridian; for if the Sunne is vpon the Meridian iuſt when the 24. houre glaſſe is out, then you may aſſure your ſelfe that you haue ſayled N. or S. and are ſtill vnder the ſame Meridian that you were at the firſt: but if the 24. houre glaſſe be out before the Sunne comes to the Meridian, for euery 4. min. that the glaſſe is out before noone, your difference of Longit. is 1. deg. to the Weſtward, and for euery houre 15. deg. And contrary, if the Sun come to the Meridian before the glaſſe is out, then according to the ſame proportion of time, is your difference of longit. to the eaſtward, which difference of Longit. if you multiply by the number of miles anſwerable to a deg. of Longit. in that Latit. where you then finde your ſelfe to be, the product gines the miles of diſtance, that you are either to the Eaſtward or Weſtward of the Meridian, that you departed from.

The like may alſo be effected by any of thoſe fixed ſtarres, whoſe true time of comming to the Meridian you know: For if the accompt of time preciſely kept by your glaſſe, and the ſtars comming to the Meridian, as you finde in your table of right aſcenſion doe iuſtly agrée, then are you ſtill vnder one and the ſame Meridian, but if the time be paſt by your accompt, that the ſaid Starre ſhould be vpon the Meridian before the Starre doth come to the Meridian, for euery houre that the ſtarre comes to the Meridian after the ſaid time paſt, your difference of Longitude is 15. de. to the Weſtward, and for euery houre that the Starre comes to the Meridian before by your accompt, of time truely kept, it ſhould be vpon the Meridian, your difference of Longit. is 15. deg. to the Eaſtward. Thus much ſhall ſuffice to be ſpoken concerning my opinion for finding

the Longitude at Sea by obſeruation, and now it reſts to ſpeake ſomwhat of ſome neceſſarie helpes, for the finding thereof by dead reckoning, as is before promiſed.

Of the Variation of the Compaſſe.

COncerning the Variation of the Compaſſe, it hath beene very learnedly treated of by diuers of our owne Countrey-men, and in our vulgar tongue, and namely by Mr. Norman, and Mr. Burrowes, in their Booke called the New Attractiue, and Variation of the Compaſſe: And ſince that, moſt excellently and ingeniouſly written of by that rare and learned Mathematitian of our time Mr. Wright, in his booke of the Correction of Errors in Nauigation: as alſo in his Tranſlation called the Haven-finding Art: In which reſpect it is needeleſſe for me heere to write any thing thereof: only let it ſuffice to ſpeake a little thereof, and being neceſſary to the knowledge of the foregoing matter, for them that would willingly note how much the Cõpaſſe doth varie in ſeuerall places of their ſayling. I thinke it beſt to haue the Needles of their Cõpaſſes touched vpon a good ſtone, and ſo placed directly vnder the North point of the Fly, without allowing any Variation at all, the outer edge of the ſaid Fly to be graduated each quarter into 90. deg. for the ready reckoning of the deg. that the Compaſſe doth vary from the true North or South either toward the Eaſt or Weſt: ouer which Fly, it is neceſſarie to haue a round Circle of Braſſe, with 2. ſights vpon the ſame the one directly againſt the other at oppoſite points to be raiſed perpendicularly where occaſion ſhall ſerue: which circle, with the ſights thereon, as I haue ſaid, being placed vpon the glaſſe, ouer the Fly, within the box, where the Compaſſe is: when you would obſerue the Variation of the Compaſſe iuſt. either at the Sunne a riſing or ſetting, turne the ſights in the braſſe Circle towards the ſunne, and looking through the ſame, marke preciſely how many degrées the Sunne riſeth or ſetteth from the Eaſt or Weſt point of the Fly or Compaſſe: For if the Sun be in the Equinoctiall hauing then no amplitude, ſo much as is the difference of the Sunnes riſing or ſetting from the E. or W. points, ſhewed by the Compaſſe, is the variation

of

of the Compaſſe, from the true Nozth oz South: but if the Sunne be either to the Nozthward oz Southward of the Equinoctiall, hauing amplitude: then is there a reſpect alſo to be had to the Sunnes amplytude: as thus. if the Sunne haue Nozth oz South amplitude, and that you obſerue the Sunne to riſe oz ſet ſo much from the E. oz W. point of the Compaſſe as is the Sunnes amplitude, and likewiſe the ſame way that the amplitude is, then hath the Compaſſe no variation: but if the Sunne hauing nozth amplitude, riſeth notwithſtanding moze Nozthery by your Compaſſe, then by the ſaid amplytude it ſhould doe, the degrées of true amplitude, deducted from the amplitude, which the Compaſſe ſheweth, leauing the variation of the Compaſſe to be Eaſtward of the Nozth: but if the true amplitude be greater, then the Compaſſe ſheweth, the ons deducted from the other, leaueth the variation to the Weſtward of the nozth: and if the amplitude be ſoutherly, and the Compaſſe ſhew the Sunne to riſe nozthery, both the differences added together giues the variation eaſterly: oz if the Amplitude be Nozthery, and the Compaſſe ſhewes it to be Southerly, then both the differences added together, giues the variation Weſterly. All this is to be vnderſtood, when you obſerue by the Amplitude Orciue, viz. at the Sunnes riſing: foz if you obſerue the ſetting thereof, then by adding oz deducting the differences betwixt the true amplytude knowne, and the Amplitude giuen by the Compaſſe, the totall oz remaine ſhewes the Compaſſe to vary ſo much to the contrarie ſide: an example will make all this plaine vnto you, which let it be thus pzoposed. Suppoſe that being at ſea, you find by the Table of ſines hereafter ſet downe (oz by ſome other meanes) the Sunnes Amplitude at that time to be 20. degrées to the Nozthward, and ſetting the Sunne at his riſing by the Compaſſe (as is befoze ſhewed) you finde that the Sunne riſeth 35. deg. to the Nozthward of the Eaſt, which is ſomewhat to the Nozthward of the nozth east and by E. point, therefoze ſubtracting 20. deg. the Sunnes true Amplitude. from 35. deg. the Amplitude which the compaſſe ſheweth, the remainer being 15. deg. ſheweth the Compaſſe to be ſo much varyed from the Nozth to the Eaſtward, which is 1. wholepoint, and about 1 third: otherwiſe the Sunne hauing the ſame Amplitude Nozthery, (as is afoze-

ſaid) and ſetting him at his going downe by the compaſſe, the ſaid Compaſſe ſheweth him to ſet only 5. deg. to the Northward of the Weſt, which deducted from 20. deg the true Amplitude leaueth 15 deg. for the variation of the Compaſſe to the Eaſtward, as before.

As for Example.

Suppoſe that the Sunne hauing 23. deg. of South Amplitude, and the Compaſſe ſheweth his Amplitude or riſing to be 11. degrees Northerly, adde 23. degrees the true Amplitude, with 11. degrees of contrary Amplitude, which the Compaſſe ſheweth, and the product 34 deg being 3. whole points and ſomewhat more, ſheweth that the Compaſſe is ſo much varied from the true North to the Eaſtward.

Againe, the Sunne hauing the ſame Amplitude Southerly, you obſerue at his ſetting, and find by your Compaſſe that hee ſetteth 11. deg. Northerly, adding the 2. Amplitudes as aforeſaid, 23. and 11. the product 34. ſheweth the variation ſo much to the Weſtward, being that in the obſeruation at his riſing, the Eaſt and by North points of the Compaſſe, ſtandeth where the Eaſt Southweſt ſhould be: and at his ſetting in the other obſeruation, the Weſt and by N. points of the Compaſſe, pointeth to the Sun, in which place ſhould be the Weſt Southweſt points.

Theſe few words will ſuffice, being (that albeit to the Ignorant they ſeeme ſomewhat darke) yet in the practiſe thereof, they ſhall find it I doubt not, but very plaine and eaſie for their vnderſtanding; otherwiſe there are ſundry ſorts of Inſtruments to finde the variation by, but others hauing already written thereof, I haue thought good alſo to ſhew my opinion of this plaine and eaſie way, knowing that the Mariner hauing made experience of many wayes, will onely vſe that which he findeth beſt, both for his eaſe, profit, and truth thereof. And note, that whatſoeuer is here ſpoken concerning the finding of the variation by the Amplitude, the very like may be alſo obſerued by the Azimuth, which by the Sunne or Starres being to be ſeene, may at any time be knowne.

How

How many Leagues ſayling vpon any Point of the Compaſſe, will raiſe or lay a Degree of Latitude, and what difference of Longitude you make therewith.

THis is ſo common in euery Booke, that I neede not to write thereof, but onely being that it is a neceſſary helpe to that which hath beene before ſpoken of, it is not amiſſe to ſet it heere downe being as followeth.

Firſt, ſayling S. or N. you keepe ſtill one Meridian: and in ſayling 20. Engliſh leagues you eyther raiſe or depreſſe the Pole 1. deg. But if you ſayle vpon the firſt point or Rombe from N. or S. eyther Eaſtward or Weſtward, you muſt ſayle 20. leagues, and one third part to raiſe or lay a degree of Latitude: and ſo hauing changed your Paralell one degree, you are alſo departed from your firſt Meridian 4. leagues that way which your courſe was.

Vpon the ſecond point or Rombe from N. or S. 21. leagues and one third, raiſe or lay a degree of Latitude, and your diſtance from the Meridian, is 8. leagues and one third.

Sayling vpon the third point 24. leagues, to raiſe or lay a degree, and diſtance from the firſt Meridian, is 13. leagues and one third.

Vpon the fourth point 28. leagues and one third, raiſe or lay a deg. of Latitude, and diſtance from the Meridian, is 20. leagues.

Vpon the fifth point 36. leagues, raiſe or lay a degree of Latitude, and diſtance from the Meridian, is 30. leagues.

Sayling vpon the firſt point or Rombe 52. leagues and one third, raiſe or lay a degree, and hauing altered your Latitude one degree vpon that point, you are departed from the firſt Meridian 48. leagues and one third.

If you ſayle vpon the ſeuenth point, being the next from the Eaſt or W. you muſt ſayle 102. leagues and 2. thirds, before you raiſe or lay the Pole one degree, and then are you 101. leagues from your firſt Meridian, but if you ſayle Eaſt or Weſt, then are you ſtill in a Paralell, and neyther raiſe nor lay the Pole at all.

To finde the distance betweene any two places, knowing the Longitude and Latitude of them.

IF the 2. places differ only in Longitude, then are they both vnder 1. and the same Meridian: and to know the distance betwixt them in miles or leagues, multiply the number of the deg. of difference, by 60. miles, or 20. leagues, the Product of which multiplication giues the true distance betweene them in miles or leag. according as you worke them, being that 60. miles or 20. leagues makes 1. degree of a great Circle: but if the one place haue N. Latitude, and the other S. then adde both their Latitudes together, and worke as aforesaid: and if both the places are vnder the Equinoctiall, then haue they no Latitude: And there likewise 60. miles, or 20. leagues make 1. deg. and the working like the former. if the difference be vnder 180. deg. For if the difference be more then 180. subtract the said difference from 360. and multiply the remainer by 60. or 20. as before.

These are so plaine and easie that they need no Examples: but if they differ both in Longitude, or in Latitude, and Longitude only in any Paralell beside the Equinoctiall, the working is somewhat more difficult, by reason that the further the Paralels are distant from the Equinoctiall towards either of the Poles, the shorter they are: and the shorter the Paralels are, the fewer min. or miles make a deg so that whereas in the Equinoctiall 60. min or miles make a deg. in that paralell where the Pole is raised 52. deg. 37. min. makes 1. deg. viz. 1. deg. in the Latit. of 52. running in E. or W. answers to 37. miles: for which purpose. as also for diuers necessary vses I haue here added a Table, shewing the miles of distance and minut. of Time, answerable to a degree, in euery seuerall degree of Latitude from the Equinoctiall towards either of the Poles: And when you know the miles answerable to a degree in the Paralell desired, if the difference of the two places be onely in Longitude, multiply the difference of their Longitude by the number of miles answerable to a degree: and the Product sheweth the distance in English or Italian miles betwixt the said two places.

Example.

Deg. of Latit.	Minutes Deg.	Deg. of Latit.	Minutes Deg.
0	60	60	30
10	59	61	29
15	58	62	28
18	57	63	27
21	56	64	26
24	55	65	25
26	54	66	24
28	53	67	23
30	52	68	22
32	51	69	21
34	50	70	20
35	49	71	19
37	48	72	18
38	47	73	17
40	46	74	16
41	45	75	15
42	44	76	14
44	43	77	13
46	42	78	12
47	41	79	11
48	40	80	10
49	39	81	9
51	38	82	8
52	37	83	7
53	36	84	6
54	35	85	5
55	34	86	4
57	33	87	3
58	32	88	2
59	31	89	1

Example.

London and Middleborough, haue both in a manner one Latit. viz. about 52. degr. and I finde in this Table, that in the Paralell of 52. d. 37. miles make a deg. of Longit. the Longit. of London is 25. deg. 50. min. which subtracted one from another, leaues 3. deg. 50. min. for the difference of Longit. Then multiplying 3. degr. by 37. miles, the Product is 111. miles: Then for 50. min. I say by the rule of 3. if 60. min. giues 37. miles, what giues 50. min? Facit here 31. which added to 111. makes 142. miles, or 47. leag. and a mile for the distance betwixt London and Middleborough.

But if the two places differ both in Longitude and Latitude, then is the working more difficult then eyther of the former: For first you must take the difference of the two places in Longit. and then their difference also in Latit. and multiplying the degr. of their difference in Latit. by 60. set the Product thereof by it selfe, for the first number: then multiply the difference of Longit. by the number of miles answerable to each Latit. seuerally, and adde both the Products together: the halfe whereof set downe for your second number, and multiplying each of the said two numbers into it selfe squarely, adde both the products together, and extracting the square roote thereof, the said square roote, is the distance betwixt the two places desired.

As for Example.

To goe directly in a right Line from Callice in France, to Constantinople in Grecia: I find by the Tables following, that the Longit. of Callice is 29. deg. 10. min. and the Latit. thereof 50 deg. 40. min. And the Longitude of Constantinople is 61. degr. 20. min. and the Latit. 44. deg. 40. min. then subtracting the

the leſſer Longitude, from the greater, the difference of Longitude is 32. deg. 10. min.

Longit.
Conſtantin. 61. deg. 20. min.
Callice, 29. degrees 10. min.
Difference, 32. degr. 10. min.

Alſo I take the one Latitude from the other, and there reſts 6. deg. for the difference thereof, which 6. degrés multiplyed by 60. miles, produceth 360. miles for the diſtance betwixt the Paralell of Callice, and the Paralell of Conſtantinople. Now for the diſtance betwixt Callice, and the Meridian of Conſtantinople, I multiply 32. degrés 10. minutes, the difference of Longitude by 38. the miles anſwerable to a degré in the Paralell of Callice, and the Product is 1222. miles: Then multiply 32. degrés 10. minutes, the aforeſaid difference of Longitude by 42. miles anſwering to a degré in the Paralell of Conſtantinople, which Product being 1351. miles, is the diſtance betwéne Conſtantinople, and the Meridian of Callice: Thoſe two diſtances added together make 2573. the halfe whereof, being 1286. is the meane diſtance betwirt the Meridians of the ſaid two places: So haue you two numbers, viz. 360. miles, the diſtance that the Paralell of Conſtantinople is to the Southwards of Callice, and 1286. miles the diſtance that Conſtantinople is to the Eaſtward of the Paralell of Callice: Therefore if you multiply 360. into it ſelfe, the Product is 129600. And likewiſe multiplying 1286. into it ſelfe the Product is 1653796. which both added together, make 1783396. the ſquare root of which number is the diſtance deſired: Which to helpe thoſe that are not perfit in extraction of Root s, I haue héere ſet downe the working thereof as followeth: —

Lat.
Callice, 50. degrees 40. min.
Conſtantin. 44. deg. 40. min.
Difference, 6. degr. 0. min.

1 2 2 2
1 3 5 1
2 5 7 3
1 2 8 6

1653796
129600
1783396

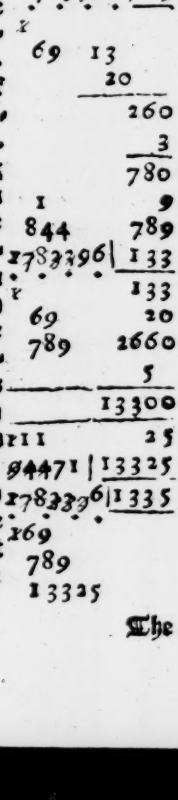
The manner how to extract the ſquare and Cube roote of any number is more plainely taught, toward the end of the booke.

First, I ſet downe the propoſed number with a Quotient, and vnder the laſt figure, I put a pricke: and ſo likewiſe vnder each other Figure toward the left hand, leauing betwirt each pricke one Figure vnpricht: So haue I vnder this number, 4. prickes, ſignifying that the forte muſt conſiſt of foure Figures, and to finde them out,

1783396 | 1
. . . .

I

I ſeeke what is the greateſt ſquare number ouer the firſt pricke, which is 1. therefore I put 1. in the quotient for the firſt figure of the roote, and cancell the figure ouer the firſt prick: then to find the ſecond figure of the roote, I multiply the quotient by 20. which being 1. doth neither multiply nor deuide: therefore I ſeeke how often 20. is contained in 78. the number of the ſecond pricke, which you muſt take no oftner then that the ſquare of the ſaid number being added, therewith may be likewiſe taken there from, ſo I ſee 3. times 20. being 60. and the ſquare of 3. which is 9. added thereto, is 69. which may be taken there from: therefore I put 3. in the quotient, taking 69. from 78. the number ouer the 2. pricke leaues 933. to the 3. pricke: then for the 3. figure of the roote I multiply 13. the quotient by 20. the Product is 260. which I ſeeke how often it may bee taken out of 933. and I find that 3. times 260. is 780. whereunto the ſquare of 3. being added makes 789. therefore I put 3. in the quotient, and ſubtracting 789. from 933. reſts 14496. for the 4. pricke: then for the laſt figure of the roote, I multiply 133. the whole quotient already found by 20. and the Product is 2660. which may bee taken 5. times in 14496. for 5. times 2660. is 13300. vnto which 25. the ſquare of 5. added makes 13325. therefore I put 5. in the quotient, for the fourth and laſt figure of the roote: and making my ſubtraction as afore, the worke will ſtand as you ſee, by which you may know the ſquare roote of the propoſed number to bee 1335. and very neere. So I conclude the true diſtance betweene Callice and Conſtantinople, to bee 1325. miles, and neere halfe a mile. The manner how to extract the roote of any number, is ſet downe more at large after the Tables of Sines.

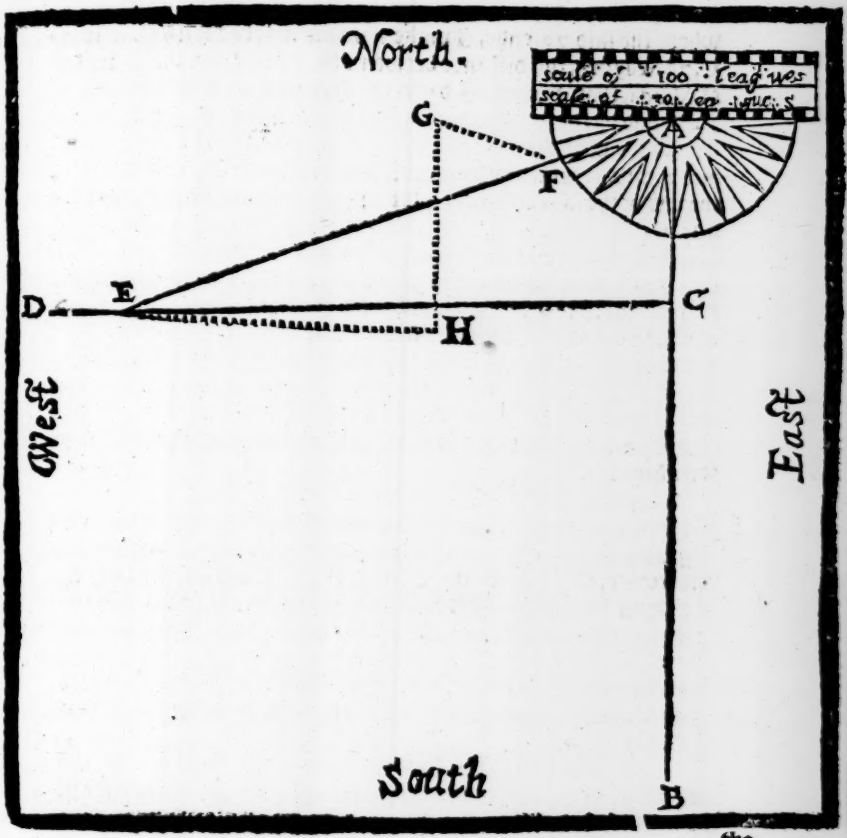


The

The ingenious Mariners may sayle by knowing the true Longitude & Latit. of places, to any place assigned, aswell by a blanke of paper or past-bord, as by the Sea Card, by the help of a Protractor in this manner: First vpon the bord or paper lyned with Meridians and Paralels, or to them that can make a right Angle vppon any pricke or poynt, a sheete of cleane paper is sufficient to keepe a Trauerse vpon: To knowe your course from the place where you are, to any other place assigned: as I say, vpon your bord or paper make a pricke for the place where you then are, and from the said pricke drawe a right line to represent the Meridian of the same place: then placing the Center of the Protractor vpon the said pricke, lay the N. or S. point of the Fly or Protractor as the place beareth, vpon the line ready drawne. Then by the last Chapter learne the distance of miles betwixt the place where you are, and the paralell of that place you are bound to: or more briefly, what portion of the meridian is comprized betweene the Latit. of the two places: that distance by the scale of the protractor, apply to the Meridian by you drawne, and where the distance ends, drawe another line square, or at right angles to the other, either E. or W. as the situation of the place assigned requireth: and by the former Chapter learne the distance betwixt the Meridian by you drawne, and the Meridian of the other place assigned: which knowne (by your Scale) apply that distance to your line of East or West, and where that number of distance ends, make another pricke for the true situation of your place assigned: then laying a third or ruler from the Center of the Protractor, being the place where you are, and extending it to the other pricke last made, the edge of the ruler or line shewes vpon the protractor, the point of the Compasse that the place assigned beares from the place where you are: and the Scale applyed to the said line or edge of the ruler, shewes the distance: also the distance may be knowne by extracting the square rote as is before shewed an example of this, and for the vse of the Trauerse-bord, and so an end.

A Ship being at the Lizard, in the Southwest parts of England, whose Longitude and Latitude I finde in the Table following to be 18. degrees. 30. minutes, and 50. deg 10. minutes, is bound

bound for an Iland in the Ocean sea called Maida, whose Longitude I finde in the same Table, to be 2. degrées, 40. minutes, and Latitude 46. deg. 40. min. the difference of their Latitude is 3. deg. 30. min. which is 210 miles, or 70. leagues: Therefore from Type of a Traverse boord and a Protractor.



the

the prick or point A. I draw the lines A.B. in the Trauerse boord here adioyning, and vpon the point A. I place the Center of the Protractor, being one halfe of the Mariners Compasse, the middle point whereof representing the N. or S. (as occasion serues) I lay vpon the line A.B. and applying 70. leagues (whereof the scale on the edge of the Protractor containes 100.) from A. towards B. where the said 70. ends, I make a pricke marked with C. so is A. C. 70. leagues, the distance betweene the Lizard and the Paralell of Maida, then from C. I draw the line C. D. at right angles to A. B. and by the former chapter I find the distance betweene Maida, and the Meridian of the Lizard, to be 629. miles or 209. leag. and 2. miles: which by scale aforesaid applyed to the line C. D. at the end of the said distance, I set a pricke marked with E. so is the line C. E. 209. $\frac{1}{3}$. leagues, the distance that Maida is to the Westward to the Meridian of the Lizard, or the line A. B. then the Protract lying as at the first, I lay a ruler from the Center thereof, to the last pricke E. and with the former scale, measuring along by the edge of the ruler from A, the first pricke to E, the last: I find the distance to be 222. leagues and the ruler cuts the point West and by South, and halfe a point to the Southwards: So I conclude the Ile of Maida to be distant from the Lizard 222. leagues, and the direct course West and by South, and halfe a point Southwards.

But if the wind be scant or contrary, so that you cannot sayle by the direct course: then must you keepe a reckoning how many leagues you sayle vpon euery other point: and where you change your course, there place the Center of the Protract, keeping the Meridian or North and South line of the Protractor, Paralell to the Meridian drawne on the Trauerse-boord, and laying a ruler from the Center of the Protractor, along that point vpon which the Ship maketh her way, and to the edge of the ruler so placed, apply so many leagues of the scale, as the Ship hath sayled vpon that point, and then where that number ends, set a pricke for the place where the Ship then is, and againe, vpon that pricke place the Center of the protractor, lying as before, the South and North line thereof paralell to the Meridian or South line first drawne,

and

and then laying a ruler to the center of the Protractor, being the place where the Ship then is, and to the place assigned, it shewes vpon the Protractor, the point how they beare, and the scale applyed thereto shewes the distance, as in the former example: Hauing sayled from the Lizard in the right course 50. leagues, being then in the point F. the winde commeth to another point, so that she maketh her way West and by North 40. leagues: at the end of which course is the Letter G. from thence she runneth S. 75. leagues: at the end of which course is H. then from H. to know the distance, and what course must be kept to the prefixed place of Maida marked with E. I place the Center of the Protractor vpon H. and the edge thereof, which is then North and South Paralell or equidistant to the first line A.B. which so placed, I lay a ruler from the center thereof to E. and I find the course to be West, and halfe a point to the North 125. leagues.

Note, that it is necessary to haue vpon your Protractor two seuerall scales, a greater and a lesser, for the greater the scale is you keepe your reckoning by, the truer shall your accompt be.

Necessary Questions of Nauigation, with their Answers.

Question. 1.

IF I saile from the Paralell of 50. degrées, 70. leagues vpon a Southwest course, I demand how much I lay or depresse the Pole, and how many degrées and Leagues, I depart from the Meridian?

Answ. Pole depressed 2. deg. 28. min. difference of Longitude 3. deg. 25. min. leagues from the Meridian 49. and $\frac{1}{7}$.

Q. 2. If I saile from the paralell of 40. degrées vpon a West Northwest course, vntill I raise the Pole 3. deg. 30. min. I demand how many leagues I haue sailed? and how many degrées and leagues I haue departed from the Meridian?

A. Leagues sailed 183. difference, Longitude 12. deg. 11. min. leagues from the Meridian 169.

Q. 3. From the Paralell of 47. deg. if in sayling 108. leagues betwéene West and North, I raise the pole 3. deg. I demand vpon what Rombe I haue sailed? as also how many deg. and leagues I am from the Meridian, from whence I began that course?

A. A Rombe Northwest and by west, difference Longitude 6. degrées 36. minutes leagues from the Meridian 90.

Q. 4. If from the Paralell of 50. deg. I saile so long betwéene North and East, till I raise the Pole 6. deg. and depart from the Meridian 4. degrées I demand vpon what point of the compasse I haue sailed, and how many leagues I haue runne?

A. The course is nére North Northeast, leagues runne 126.

Q. 5. If from the Paralell of 50. degrées I saile Northwest, vntill I am 4. degrées from the Meridian where I began my course, I demand how many leagues I haue sailed, and how much the Pole is raised?

A. Leagues sailed 70. and two thirds, Pole raised two degrées and a halfe.

Q. Two Ships departing from one place of the Paralell of 50. degrées the one in sailing 145. leagues towards the West, hath raised the Pole 4. deg. and the other hath raised the Pole 7. degrées and is 95. leagues West from the Meridian of the place from whence he began his course: I demand by what course the said ships haue sailed, how many leagues the two ships haue sailed, how farre they be a sunder, and by what course they may méete?

A. The first Ship hath sailed Northwest and by west: The second hath sailed Northwest by North 172. leagues, they are a sunder 63. leagues, and the course betwéene them is North Northeast and South Southwest.

Q. 7. Two Ships departing from one place in the Paralell of 60. degrées, the one in sailing 145. leagues towards the West, hath raised the Pole 4. degrées and the other hath raised the Pole 7. degrées and is 93. leagues West from the Meridian of the place from whence hee began that course: I demand by what course the said Ships haue sailed the way of the two ships, how farre they be a sunder, and by what course they may méete?

A. The first Ship hath sailed Northwest and by West, the second

second hath sayled Northwest and by North 168. leagues, they are a sunder 64. leagues 3. deg. Easterly, course betweene them is North Northeast.

Q. 8. Two Ships saying from one place in the Paralell of 60. deg. the one saying 180. leagues Eastwards, hath raised the Pole 5. deg. I demand upon what course, and how many leagues the other Ship shall saile to bring himselfe 50. leagues North by West from the first Ship, and what they are both departed from their first Meridian?

A. The first ship hath sailed Northeast and by East, and is departed from the meridian 146. leagues. The second Ship must sayle Northeast 3. deg Northerly, leagues 220. and is departed from the Meridian where he began his course 169. leagues.

Q. 9. If I sayle from the Paralell of 50. deg. 100. leagues North, I demand what Latitude I am in?

A. In the Latitude of 55. degrees.

Q. 10. If I sayle from the Paralell of 50. deg. South, till I lay the Pole 5. deg. I demand how many leagues I haue sayled?

A. 100. Leagues.

Q. 11. If from Latitude 22. deg. I sayle in the Paralell of 60. deg. 100. leagues East, I demand what Longitude I am in?

A. In Longitude 31. degrees.

Q. 12. If from Longitude 20. deg. I sayle in the Paralell of 50. deg. to Longitude 10. degrees. I demand how many leagues I haue sayled?

A Leagues 154. and a quarter.

Q. 13. If I sayle from Longitude 20. deg. and Latitude 40. to Longitude 350. deg. 27. min. and Latitude 30. deg. I demand the rombe and distance?

A. Course West Southwest, distance 520. leagues.

Q. 14. From Longit. 20. deg. and Latit. 45. deg. Northeast 20. leagues, what Longit. and Latitude hath the second place?

A Twenty three deg. Longitude 45. deg. 42. min. Latitude.

Q. 15. From Longitude 23. deg. and Latitude 45. deg. 42. min. East and by North 30. leagues, what Longitude and Latitude hath the second place?

A. 25. deg. 9. min. Longitude, 46. degrées 5. min. Latitude.

Q. 16. From Longitude 25. deg. 9. min. and Latitude 45. deg. 59. min. Eaſt Southeaſt 25. leagues. What Longitude and Latitude hath the ſecond place?

A. 26. deg. 46. min. Longitude, 45. deg. 31. min. Latitude.

Q. 17. From Longitude 26. deg. 53. min. and Latitude 45. deg. 31. min. North 40. leagues. What Longitude and Latitude hath the ſecond place?

A. Longitude 26. deg. 53. min. Latitude 47 deg. 31 min.

Q. 18. From Longitude 26. deg. 53. min. and Latitude 47. deg. 31. min. 50. leagues Weſt Northweſt. What Longitude and Latitude hath the ſecond place?

A. Longitude 23. deg. 57. min. Latitude 48. deg. 28. min.

Q. 19. From Longitude 23. deg. 57. min. and Latitude 48. deg. 28. min. Eaſt Northeaſt 60. leagues. What Longitude and Latitude hath the ſecond place?

A. Longitude 28. deg. 27. minutes, Latitude 49. degrées 26. minutes.

Heere followeth a briefe Table of Sines for Arithmeticall Calculation, the totall ſine whereof is 10000. with certaine neceſſary Propoſitions to be wrought thereby, by which few things propoſed, and Example thereto annexed, any one that hath either an ingenious ſpirit, or a willing minde to the practiſe of the Mathematicall Sciences, may attaine to much knowledge therein.

A briefe declaration of the ſame.

WHat the Table of Sines is, hath béene very Learnedly explained by others, and therefore néedleſſe is it for me to diſcourſe thereof; onely take theſe few inſtructions for the helpe of thoſe, which as yet haue no knowledge therein. Firſt know,

that

that sayling, which is the principall thing here aymed at, is perfourmed by a true and perfect knowledge of the Spheare, by the projection whereof, all calculations, Tables calculated, and Instruments for observation are invented, protracted, framed and made.

What the the Sphere is I need not to discusse, the chiefe or great Circles thereof consisting of 360. deg. and one quarter thereof being 90. deg. which quarter being taken from the whole circumference, consisteth of these three particulars viz. An arch or part of a Circle being indeed 90. deg. or a quarter of the whole Circle: right Angle, & two equall sides thereto, of which the one is the base or ground lyne, the other a perpendicular let fall thereon at right Angles, the utmost ends or extentions, of which two lines are the limits of the aforesaid arch, or quarter of a Circle: the which three parts so fitted together in there due order, sheweth the perfit platforme of one quarter of the whole Circle, commonly called a Quadrant: the base or ground lyne whereof being deuided into 10000. equall parts, is Sinus totus or the whole sine: and the whole arch or quarter of a Circle into 90. degrées, is the whole arch belonging to the said whole sine.

Within which Quadrant, any number of deg. or min. counted from the beginning or first perpendicular may be called an arch, or part of a Circle: and another perpendicular let fall therefrom to the aforesaid base or ground line, the number of equal parts that the said perpendicular falleth vpon, is the right sine to the arch giuen: and the complement of the arch giuen, is the remainer thereof it being taken from 90. deg. of the whole quadrant. To find out the right sine of any giuen Arch, looke in the head of the Table following for the deg. thereof, and if there be any minutes therewith, looke for the minutes at the left side of the Table, and carrying your eye downeward from the degrée, till you come right against the min. the number which you find in the common Angle to them both, is the right sine of your giuen arch desired: as if you desire the sine of 35. deg 20. min. looke in the head of the Table for 35. and vpon the left side thereof for 20. and in the common square or angle right against them both, you shall finde 5783. which is the sine of 35. deg. 20. min. and if you subtract 35. deg. 20. min. from 90. degr. the re-

manner 54.deg.40.min.is the complement thereof,whose right sine (found as before is taught) is 8158. what the versed sine is, and how found out, is afterward shewed. I doubt not but that these few words will suffice for the explaining of the Table following,whose large and ample vses for Navigation and other the Mathematicall practises,these following examplary Propositions,will in some reasonable sort make manifest: by which few here proposed and answered, the ingenious may gather the manifold vses thereof,being that indeed the benefit to be reaped thereby is great,and the propositions to be wrought thereby infinite. Who so desires more perfection in this kinde of Navigation, and generally in all Mathematicall practises,let them spend some time in the study of Piticus: of the Doctrine of Triangles, not long since translated and published in our English tongue by Mr. Raph Handson.

Certaine Propositions to be wrought by the Table of Sines.

The Sunnes true place being knowne, to finde his Declination.

Prop. 1.

As the whole Sine is to the sine of the greatest Declination,so is the sine of the Sunnes distance from the nearest Equinoctiall point, to the sine of the declination for the day proposed.

Example.

I would know the Declination of the Sun the 1. of May,1630. at what time the true place of the Sun being in 20. deg.36. min.of Taurus,is 50.d.36.min. from the beginning of Aries or the vernall Equinoctiall point, therefore I must multiply the sine of 50. degr. 36.min.the Suns distance from the Equinoctiall point by the sine of 23. deg.31 min. the greatest declination,and that product must be deuided by the whole sine, whose seuerall sines being found out in the Table following,and set in order,the worke will stand thus:

——— If 90. giue 23.31. what 50.36.

10000. 3990. 7727.

Facit,3083. whose nearest arch 17.57. minutes, is the true Declination of the Sunne, the day and yeare aforesaid.

The

The Declination of the Sunne giuen, to finde his place in the Zodiacke. Prop. 2.

AS the sine of the greatest Declination is to the whole sine, so is the sine of the Declination for the day proposed to the Sunnes place or distance from the nearest Equinoctiall point.

Example.

The first of May, 1626. I finde that the Declination of the Sun is 17. degrées 57. minutes North, therefore I say:

If 23.31.	giue 90.	what	17.57.
3990.	10000.		3083.

Facit, nearest to 7727. whole arch 50. deg. 36. min. is the Sunns distance from the vernall Equinoctiall point of Aries, from which taking 30. degr. the whole sine of Aries, the remainer 20. deg. 36. min. shewes the Sunne to be so much entred into Taurus, which is the next sine.

The Latitude and Declination of the Sunne giuen, to finde the Amplitude. Prop. 3.

AS the sine of the Complement of the Latitude is in proportion to the whole sine, so is the sine of the Sunnes Declination to the Amplitude.

Example.

The 10. of Aprill 1628. I desire the Amplitude of the Sun, viz. how much the Sunne doth rise and set from the true East and West point of the Horizon, towards the North or South in the Latitude of 51. deg. 40. min. to know which the worke is thus.

If 38. deg. 20. min. the complement of the Latitude, giue 90. degrées the arch of the whole sine, what giues 11. degr. 48. min. the Declination of the Sunne.

38. deg. 20. min.	90.	11.48 minutes.
6202.	10000.	2045.

Facit, 3297. nearest whose arch sought out in the Table of sines, is 19. degr. 15. min. for the Amplitude in the day, yeare and place proposed: the same diuided by 11. and 1. quarter, the number of degrées that belongs to a point of the Compasse, sheweth one

point and 8. degrées, which the Sunne riseth and sets to the Northward of the East and West, being that the Declination is North, for if the Declination were S. then were the Amplitude southerly.

The Declination and Amplitude of the Sunne giuen, to finde the height of the Pole. Prop. 4.

AS the Sine of the Amplitude is in proportion to the sine of the Declination, so is the whole sine to the sine of the complement of the latitude.

Example.

The Declination 11. degr. 43. min. and the Amplitude 19. deg. 7. minutes, I demand the height of the Pole? Say,

If 19. 7. giue 11. 43. what 90.
3275. 2031. 10000.

Facit, 6202. nearest whose arch in the Table of sines being 38. degrées 20. minutes is the height of the Equinoctiall, or the complement to the Latitude: that subtracted from 90. degrées, leaues 51. degrées 40. minutes, for the height of the Pole or Latitude of the place desired.

The true place and Declination of the Sunne giuen, to finde the right ascention. Prop. 5.

AS the Sine of the Complement of the Declination is to the totall sine, so is the sine of the complement of the Sunnes distance from the beginning of Aries, to the Complement of the right ascension.

Example.

I desire the right ascention of the Sun the 20. of Aprill, 1629. being then in 10. de. 14. min. of Taurus, at which time his Declination is 14. deg. 56. min and the complement thereof 75. deg. 4. min. and the distance from the beginning of Aries 40. deg. 14. min. whose complement is 49. deg 49. minutes? I say then,

If 75. 4. giue 90. what 49. 49. minutes?
9663. 10000. 7634.

Facit,

Facit, 7900. whose arch in the Tables of sines is 52. degrées 11. min. the complement whereof 37. deg. 49. min. is the Sunnes right ascension: the same conuerted into houres by allowing 15. deg. to an houre, giues two houres and 31. minutes,

This is to be vnderstood, when the Sunne is betwixt the beginning of Aries, and the Tropicke of Cancer, for if the Sunne be in the Tropicke of Cancer, then is the right ascention 90. deg. or 6. houres: and if the Sunne be betwixt the Tropicke of Cancer, and the Equinoctiall point of Libra, subtract the distance that the Sun is from the beginning of Aries, out of 180. degrées, and with the remainer worke as before for the right ascention, which ascention so found, take from 180. and the remainer is the right ascention desired. But if the Sunne be betwixt the Equinoctiall of Libra, and the Tropicke of Capricorne, subtract the said distance from the beginning of Aries, out of 270. degrées, and if betwixt the Tropick of Capricorne, and the beginning of Aries, take the said distance out of 360. degrées, and then worke as before. One Example or two will make all this plaine vnto you.

The last of Iune 1630. the true place of the Sunne 17. degrées, 51. min. of Cancer, is 107. deg. 51. minutes from the beginning of Aries, which taken from 180. leaues 72. deg. 9. minutes, whose complement is 17. degr. 51. minutes, the Sunnes Declination being then 22. degr. 20. min. the complement thereof 67. degr. 40. minutes. Say then,

If 67. 40. giue 90. what 17. 51. minutes?
9250. 10000. 3065.

Facit, 3314. whose arch is 19. de. 21. min. the complement whereof 70. deg. 39. min. taken from 180 leaues 109. deg. 21. min. for the right ascention desired, which conuerted into houres, makes 7. houres 16. minutes. Againe, I desire the right ascention of 20. deg. 40. min. of Capricorne, whose distance in continuall proceeding from the beginning of Aries, being 290. deg. 40. min taken from 360. leaues 69. deg. 20. minutes, with the complement whereof 20. deg. 40. min. and the complement of the Declination of the Sunne vpon the same point of the Sunnes place 68. deg. 6. min. I worke as followeth.

If

If 686. giue 90. what 20.40.
9278. 10000. 3529.

Facit, 3803. whose arch is 22. deg. 21. min. the complement whereof 67. deg. 39. min. taken from 360. leaues 292. deg. 21. min. for the right ascention desired, the same conuerted into houres, is 19. houres 29. minutes.

The Latitue and Declination of the Sunne knowne, to finde the difference ascentionall.

Prop. 6.

As the sine of the Complement of the latitude is to the sine of the latitude, so is the sine of the Declination to the quotient found: againe, as the sine of the complement of the Declination is to the whole sine, so is the said quotient found to the difference ascentionall.

Example.

I would know the difference ascensionall, when the Declination is 20. deg. 6. minutes, and the latitude 51. degrés 40. minutes: I say,

If 38.20. giue 51.40. what 20. 6.
6202. 7844. 3437.

Facit, 4346. for the quotient found: then againe, I say,

If 69.54. giue 90. what
9391. 10000. 4346.

Facit, 4627. whose arch in the Table of sines, 27. degrés 34. minutes is the difference ascensionall for the day proposed: the same reduced into houres and minutes, makes one houre and 50. minutes, which taken from 6. a clocke, the houre that the Sunne riseth, being in the Equinoctiall, leaueth 4. houres 10. min. at what time the Sunne then riseth, and the said ascensionall difference added to 6. a clocke, makes 7. a clocke, 50. minutes, for the Sunne rising.

Againe, the said ascensionall difference doubled and added to 12. houres, the time from 6. in the morning till 6. at night, makes 15. houres 40. minutes for the whole length of the day.

This is when the Sunne hath North Declination, for if the Declination

Declination be South, then the aſcentionall difference added to 6. a clocke, giues the Sunnes riſing, and taken from 6. leaues the ſetting, and being doubled and taken from 12. houres, leaues the length of the day, as afore ſaid.

The Amplitude and difference aſcenſionall of the Sunne or Starres giuen, to finde the Declination.

Prop. 7.

AS the ſine of the time of the Sunnes riſing, conuerted into degrées and minutes, is to the ſine of the complement of the Amplitude, ſo is the whole ſine to the ſine of the complement of the Declination.

Example.

The difference aſcenſionall being 27. deg. 34. min. ſhewes the Sunne to riſe at 4. a clocke 10. min. which conuerted into degrées, makes 62. deg. 30. min. and the Amplitude being found as before is ſhewed, in the third Propoſition, is 33. deg. 38. min. and the complement thereof 56. deg. 22. min. Say then,

If 62.30.	giues	56.22.	what 90.
8870.		8326.	10000.

Facit, 9386. whoſe arch 69. deg. 50. min the complement thereof 20. deg. 10. min. is the Declination deſired.

The Latitude and Declination giuen, to find the Meridionall Altitude.

Prop. 8.

IF the Sunne haue North Declination, adde the complement of the Latitude with the Declination, the product is the Meridionall Altitude.

Example.

If the Declination, be 23. deg. 30. min. North, and the Latitude 51. degrées 40 minutes, the complement thereof 38. degrées, 20. added with 23. 30. minutes, make 61. degrées 50. minutes, for the Meridian Altitude: but if the Declination be 23. deg. 30. South, and the Latitude 51. degrées 40. minutes, ſubtract 23. degrées 30. minutes, the Declination from 38. degr. 20. minutes,

the

the complement of the Latitude, and the remainer 14. deg. 50. min. is the altitude desired: and if the Sunne be in the Equinoctiall, hauing no Declination, then is the Meridian altitude equall to the complement of the Latitude.

The Latitude and Declination knowne, to finde the height of the Sunne at any houre of the day.

Prop. 9.

FIrst you are to consider, whether the Sunne be in the Equinoctiall, or whether he hath North or South Declination, for if the Sunne be in the Equinoctiall, then as the whole sine is to the sine of the complement of the Latitude, so is the sine of the complement of the Sunnes distance from noone, allowing 15. deg. for euery houre to the sine of the altitude desired.

Example.

At any time or day, the Sunne then hauing no Declination, the Latitude 51. deg. 40. min. I desire the Suns height at 9. a clocke before noone, or at 3. after noone, the complement of the Latitude is 38. deg. 20. minutes and the houres distance from noone, 45. degr. whose complement is also 45. deg. Say then,

If 90. giue 38. 20. what 45.
10000. 6202. 7071.

Facit, 4385. whose arch 26. deg. is the height of the Sun aboue the Horizon, the time and place proposed.

If the Sunne haue Declination, then is the working somewhat more tedious, except only at 6. a clocke, either before or after noone: for which houre, as the whole sine is to the sine of the Latitude, so is the sine of the Declination, to the sine of the Altitude.

Example.

The 10. of Aprill 1624. the Latitude 51. deg. 40. min. and the Declination 11. deg. 48. min. Say,

If 90. giue 51. 40. what 11. 48.
10000. 7844. 2045.

Facit, 1604. whose arch 9. deg. 14. min. is the Altitude desired.

But for any other houre of the day, if it be lesse then 6. houres,

or

or 90. deg. worke as followes, multiply the sine of the houres distance from noone by the sine of the complement of the Latitude, the product deuide by the whole sine, and the arch of the quotient taken from 90. set apart for ỹ number first found, which number so found, compare with the latitude, then multiply the whole sine, by the sine of the lesser, and deuide the Product thereof by the sine of the greater: and to the complement of the arch of the Product adde the declination of the Sunne if the Declination be Northerly, or subtract if the Declination be Southerly, and if the Product or remainer be more then 90. deg. take it from 180. and the rest is the second found number, which two numbers so knowne.

As the whole sine is to the number first found, so is the second found number to the Altitude desired.

Example.

May yere or day at 8. a cloche the Latitude 51. deg. 40. min. the distance of the Sunne from noone 45. deg. and the Declination 11. deg. 43. min. I desire the Sunnes height: Say.

If	90.	giue 38.20.	what 45.
	10000.	6202.	7071.

Facit, 4385. whose arch 26. deg. taken from 90. leaues 64. deg. for the first found number, then comparing the Latitude, and it together, the Latitude being the lesser, I multiply the whole sine by the sine thereof, and deuide by the sine of the first found, saying,

If	64.0.	giue 51.40.	what 90.
	8988.	7844.	10000.

Facit, 8717. whose arch being 60. deg. 46. min. to the Complement thereof 29. deg. 14. min. I adde the Declination 11. deg. 43. min. and the totall 40. deg. 57. min. is the second found number, which two numbers so knowne, say againe.

If	93.	giue 64.0.	what 40.57.
	10000.	8988.	6554.

Facit, 5890. whose arch 36. deg. 5. minutes, is the Altitude of the Sunne desired.

Againe, if the houre for which you desire the Sunnes height, be more then 6. houres or 90. degrees from the Meridian, you

must

muſt ſubtract the ſaid diſtance from 180. and multiply the ſine of the remainer by the ſine of the complement of the Latitude, which product being deuided by the whole ſine, the complement of the quotients arch is the firſt found number, the ſine whereof compare with the ſine of the Latitude, multiplying the whole ſine by the leſſer: and deuiding the product by the greater: from the arch of which quotient, if you take the complement of the Declination, you haue the ſecond found number, the ſine whereof multiplyed by the ſine of the firſt found, and the product deuided by the totall ſine, the quotients arch is the Altitude deſired.

Example.

At 5. in the morning, the Latitude 51. deg. 40. min. the houres diſtance from none 7. or 105 deg. which deducted from 180. leaues 75. deg. for the houres diſtance, Say then.

If 90. giue 38.60. what 75.0.
10000. 6202. 9659.

Facit, 5990. whoſe arch being 36. deg 48. min the complement thereof 53.12. is the firſt found number: Say then againe,

If 53.12. giues 51.40. what 90.
8007. 7844. 10000.

Facit, 9796. from whoſe arch 78. deg. 25. min. taking 78. deg 17. min. the complement of the Sunnes Declination, reſts 8 min. for the ſecond found number, which 2. numbers found, Say,

If 90. giue 53.12. what 08.
10000. 8007. 023.

Facit, 18. whoſe arch 6. min. is the height of the Sunne aboue the Horizon at 5. in the morning, or 7. in the euening, the day and time aforeſaid.

The Latitude giuen, to find how many minutes or miles of the Equinoctiall, makes a degree of Longitude in any paralell.

Prop. 10.

As the whole Sine is in proportion to 60. ſo is the ſine of the complement of the Latitude, to the miles anſwerable to a degree in the Latitude deſired.

I de-

I desire to know how many miles in running East or West in the Latitude of 51. deg. 40. minutes, will alter one degree of Longitude? Say,

If 90. giue 60. what 38.20.
10000. 6204.

Facit, 37. for the number of miles answerable to a degree in the Latitude desired.

The Course and distance giuen, to finde out the difference of Latitude.

Prop. 11.

As the whole sine is to the miles of way runne, so is the sine of the courses distance from East to West, the minutes of difference of Latitude.

Example.

Running West Southwest, which is 22. deg. 40. minutes from the West 75. leagues or 225. miles, I demand the difference of Latitude? Say,

If 90. giue 225. what 2030.
10000. 3827.

Facit, 86. minutes or one deg. 26. min. for the differenes of Latitude vpon the said course and distance.

By course and distance giuen, to finde the difference of Longitude.

Prop. 12.

As the whole sine is to the miles of way that you haue run, so is the sine of the deg. that your course is distant from South or North to the miles that you are departed from your first Meridian.

Example.

Running Northwest and by North which is 33. deg. 45. min. from the North 60 leagues or 180. miles, I demand the difference of Longitude? Say,

If 90. giue 180. what 33.45.
10000. 5556.

Facit, 100. miles which you are departed from the Meridian

to the Westward, which if you diuide by the number of miles answerable to a degrée of Longitude, in the Latitude where you then find your selfe to bée, the quotient giues you the deg. and min. of the difference of longitude.

By the distance and departure from the Meridian giuen, to find the course.

Prop. 13.

As the miles of distance that you haue runne, is in proportion to the whole Sine, so is the miles of your departure from the Meridian to the sine of your course from South to North.

Example.

Being departed from the first Meridian 75. miles in the running of 50. leagues, or a 150. miles, I demaund vpon what point I haue sayled, it being betwixt South and West: Say,

If 150. giue 10000. what 75.

Facit, 5000. whose arch 30. deg. is the distance from South towards West that the course is, which is Southwest and by South southerly.

The Latitude, Declination and height of the Sunne giuen, to know the houre of the day.

Prop. 14.

Adde the complement of the Latitude, and the Declination together, and from the sine of the total, subtract the sine of the altitude obserued, the remainer is your number first found, which number first found, multiply by the whole sine, and deuide by the sine of the complement of the Latitude, the quotient whereof is the second found number, which second number so knowne, as the sine of the complement of the Declination is to the totall sine, so is the said second found number to the quotient, which quotient taken from the whole sine, the complement of the arch to the remainer, is the Sunnes distance from none in degrées and minutes.

Example.

The 15. of May 1625. the Declination 21. deg 4. minutes, and the

the complement of the Latitude 38. deg. 20. min. added together, is 59. deg. 24. min. the ſine thereof 8607. the height of the Sunne obſerued 48. deg. 30. m. the ſine therof 7090. the which taken from the former number, leaues 1117. for the firſt found number: then I ſay,

If 38.20. giue 90. what
6202. 10000 1117

Facit, 1801. for the ſecond found number. Againe ſay.

If 68.56. giue 90. what
9332. 10000. 1801

Facit, 1929. which taken from 10000. leaues 8071. whoſe arch 53. deg. 49. min. ſubtracted from 90. leaues 36. deg. 11. min. for the Sunnes diſtance from the Meridian: that conuerted into houres, is 2. houres 24. min. from noone, when the Sunne is ſo high as aforeſaid.

To finde the Sinus verſus of any giuen Arch.

Prop. 15.

IF the arch giuen, be leſſe then 90. ſubtract it from 90. and the ſine of the remainer taken from the total ſine, leaues the Sinus verſus but if the giuen arch be greater then 90. deg. ſubtract 90 deg. therefrom, and ſeeke the ſine of the remainer, which is alwayes the complement of the giuen arch: which Sinus adde to the whole ſine, and the totall thereof is the Sinus verſus of the giuen arch deſired

Example.

To know the Sinus verſus of 47. deg. 12. min. the complement thereof is 42. degrees, 48. minutes, whoſe ſine 6794. taken from 10000. the whole ſine reſteth 3206. the reuerſed ſine of 47. deg. 12. minutes.

Likewiſe to know the reuerſed ſine of 137. deg. 25. minutes, which is more then 90. deg. taking 90. therefrom, there reſteth 47. degrees 25. minutes, the Sinus whereof 7363. added to the whole ſine, maketh 17363. for the reuerſed ſine of 137. degrees 25. minutes.

A Table of Sines.

The Degrees of the Quadrant.

M	0	1	2	3	4	5	6	7	8	9
1	3	177	351	526	700	874	1848	1222	1395	567
2	6	180	353	529	703	877	1051	1224	1398	570
3	9	183	355	532	705	871	1054	1227	1400	573
4	12	86	61	35	09	83	57	3	03	75
5	14	88	62	38	12	86	60	33	06	79
6	17	92	66	41	15	89	63	36	09	82
7	20	95	69	44	18	92	65	39	12	84
8	23	98	72	47	21	95	68	42	15	87
9	26	201	75	49	24	98	71	45	18	90
10	29	04	79	52	25	900	74	47	2	93
11	32	06	81	55	28	03	77	50	24	96
12	35	09	84	58	32	06	80	53	26	99
13	38	12	87	61	35	09	83	56	29	1602
14	41	15	90	64	38	12	86	59	32	05
15	44	18	93	67	41	15	89	62	35	08
16	46	21	95	70	44	18	91	65	38	10
17	49	24	98	73	47	21	94	68	4	13
18	52	27	401	76	50	24	97	71	41	16
19	55	30	04	78	53	27	1100	73	46	19
20	58	33	07	81	56	30	03	76	49	22
21	61	35	10	84	58	32	06	79	52	25
22	64	38	13	87	61	35	09	82	55	27
23	67	41	16	90	64	38	12	85	58	30
24	70	44	19	93	67	41	15	88	61	33
25	73	47	22	96	70	44	18	91	64	36
26	76	50	25	99	73	47	20	94	67	39
27	78	53	27	602	76	50	23	97	69	42
28	81	56	30	05	79	53	26	99	72	45
29	84	59	33	08	82	56	29	1302	75	48
30	87	62	36	10	85	59	32	05	78	50

The Degrees of the Quadrant.

M.	0	1	2	3	4	5	6	7	8	9
31	90	265	439	613	787	961	1135	1308	1481	1653
32	93	268	442	616	790	964	1138	1311	1484	1656
33	96	271	445	619	793	967	1141	1314	1487	1659
34	99	73	48	22	96	70	44	17	90	62
35	102	76	51	25	99	73	46	20	92	65
36	05	79	54	28	802	76	49	22	95	68
37	07	82	56	31	05	79	52	25	98	70
38	10	85	59	34	08	82	55	28	1501	73
39	13	88	62	37	11	85	58	31	04	76
40	16	91	65	40	14	88	61	34	07	79
41	18	94	68	42	16	90	64	37	10	82
42	22	97	71	45	19	93	67	40	13	85
43	25	300	74	48	22	96	70	43	15	88
44	28	02	77	51	25	99	72	46	18	91
45	31	05	80	54	28	1002	75	48	21	93
46	34	08	83	57	31	05	78	51	24	96
47	37	11	85	60	34	08	81	54	27	99
48	40	14	88	63	37	11	84	57	30	1702
49	43	17	91	66	40	13	87	60	33	05
50	45	20	94	68	43	16	90	63	36	08
51	48	23	97	71	45	19	93	66	38	11
52	51	26	500	74	48	22	96	69	41	14
53	54	29	03	77	51	25	98	72	44	16
54	57	31	06	80	54	28	1201	74	47	19
55	60	34	09	83	57	31	04	77	50	22
56	63	37	12	86	60	34	07	80	53	25
57	66	40	15	89	63	37	10	82	56	28
58	69	43	17	92	66	39	13	86	59	31
59	72	47	20	95	69	42	16	89	61	34
60	74	50	23	97	71	45	19	92	64	36

The Degrees of the Quadrant.

M.	10	11	12	13	14	15	16	17	18	19
1	1739	1911	2082	2252	2422	2591	2759	2926	3093	3258
2	42	14	85	55	25	94	62	29	96	61
3	45	17	88	58	28	97	65	32	98	64
4	47	19	90	61	30	99	67	35	3101	67
5	50	22	93	64	33	2602	70	38	04	69
6	53	25	96	67	36	05	73	40	07	72
7	56	28	99	69	39	08	76	43	09	75
8	59	31	2102	72	42	11	79	46	12	78
9	62	34	05	75	45	13	81	49	15	80
10	65	37	07	78	47	16	84	51	18	83
11	67	39	10	81	50	19	87	54	20	86
12	70	42	13	83	53	22	90	57	23	89
13	73	45	17	86	56	25	93	60	26	91
14	76	48	19	89	59	28	95	63	29	94
15	79	51	22	92	62	30	98	65	32	97
16	82	54	25	95	64	33	2801	68	34	3300
17	85	57	27	98	67	36	04	71	37	02
18	88	59	30	2300	70	39	07	74	40	05
19	90	62	33	03	73	41	09	76	43	08
20	93	65	36	06	76	44	12	79	46	11
21	96	68	39	09	78	47	15	82	48	13
22	99	71	42	12	81	50	18	85	51	16
23	1802	74	45	15	84	53	21	88	54	19
24	05	77	47	17	87	55	23	90	56	22
25	08	79	50	20	90	58	26	93	59	24
26	10	82	53	23	92	61	29	96	62	27
27	13	85	56	26	95	64	32	99	65	30
28	16	88	59	29	98	67	35	3001	67	32
29	19	91	61	31	2501	69	37	04	70	35
30	22	94	64	34	04	72	40	07	73	38

The Dogrees of the Quadrant.

M.	10	11	12	13	14	15	16	17	18	19
31	1825	1996	2167	2337	2507	2675	2843	3010	3176	3341
32	28	99	70	40	09	78	46	13	78	43
33	30	2002	73	43	12	81	48	15	81	46
34	33	05	76	46	15	83	51	18	84	49
35	36	08	78	49	18	86	54	21	87	52
36	39	11	81	51	21	89	57	24	89	54
37	42	14	84	54	24	92	60	26	92	57
38	46	16	87	57	26	95	62	29	95	60
39	48	19	90	60	29	98	65	32	98	63
40	50	22	93	63	32	2700	68	35	3201	65
41	53	25	96	65	35	03	71	37	03	68
42	56	28	98	68	38	06	74	40	06	71
43	59	31	2201	71	40	09	76	43	09	74
44	62	34	04	74	43	12	79	46	12	76
45	65	36	07	77	46	14	82	49	14	79
46	68	39	10	80	49	17	85	51	17	82
47	70	42	13	82	52	20	87	54	20	85
48	73	45	16	85	55	23	90	57	23	87
49	76	48	18	88	57	26	93	60	25	90
50	79	51	21	91	60	28	96	62	28	93
51	82	53	24	94	63	31	99	65	31	96
52	85	56	27	97	66	34	2901	68	34	98
53	88	59	30	99	68	37	04	71	36	3401
54	91	62	31	2402	71	40	07	73	39	04
55	94	65	35	05	74	42	10	76	42	06
56	96	68	38	09	77	45	13	79	45	09
57	99	70	41	11	80	48	15	82	47	12
58	1902	73	44	14	83	51	18	85	50	15
59	05	76	47	16	85	54	21	87	53	17
60	08	79	49	19	88	56	24	90	56	20

The Degrees of the Quadrant.

M	20	21	22	23	24	25	26	27	28	29
2	3423	3586	3749	3910	4070	4229	4 86	4542	4697	4851
1	26	89	51	13	73	31	89	45	4700	53
3	28	92	54	15	75	34	91	48	02	56
4	31	94	57	18	78	37	94	50	05	59
5	34	97	59	21	80	39	96	53	07	61
6	37	3600	62	23	83	42	99	55	10	63
7	39	03	65	26	86	45	4402	58	13	66
8	42	05	68	29	89	47	04	61	15	68
9	45	08	70	31	91	90	07	63	18	71
10	47	11	73	34	94	52	10	66	20	73
11	50	13	76	37	96	55	12	68	23	76
12	53	16	78	39	99	58	15	71	25	78
13	56	19	81	42	4102	60	18	73	28	81
14	58	22	84	45	04	63	20	76	31	83
15	61	24	86	47	07	66	23	79	33	86
16	64	27	89	50	10	68	25	81	36	88
17	67	30	92	53	12	71	28	84	38	91
18	69	32	94	55	15	74	31	86	41	93
19	72	35	97	58	18	76	33	89	43	96
20	75	38	3800	61	20	79	36	92	46	98
21	77	41	03	63	23	81	38	94	48	4901
22	80	43	05	66	26	84	41	97	51	04
23	83	46	08	69	28	87	44	99	54	06
24	86	49	11	71	31	89	46	4602	56	09
25	88	51	13	74	34	92	49	04	59	11
26	91	54	16	77	36	95	51	07	61	14
27	94	57	19	79	39	97	54	10	64	16
28	97	60	21	82	42	4300	57	12	66	19
29	99	62	24	85	44	02	59	15	69	21
30	3502	65	27	87	47	05	62	17	71	24

The Degrees of the Quadrant.

M.	20	21	22	23	24	25	26	27	28	29
31	3505	3668	3829	3990	4149	4308	4464	4620	4774	4927
32	07	70	32	93	52	10	67	23	77	29
33	10	73	35	95	55	13	70	25	79	32
34	13	76	37	98	57	16	72	28	82	34
35	16	79	40	4001	60	18	75	30	84	37
36	18	81	43	03	63	21	78	33	87	39
37	21	84	46	06	65	24	80	35	89	42
38	24	87	48	09	68	26	83	38	92	44
39	27	89	51	11	71	29	85	41	94	47
40	29	92	54	14	73	31	88	43	97	49
41	32	95	56	17	76	34	90	46	99	52
42	35	97	59	19	78	36	93	48	4802	54
43	37	3700	62	22	81	39	96	51	05	57
44	40	03	64	25	84	42	98	53	07	60
45	43	06	67	28	86	44	4501	56	10	62
46	46	08	70	30	89	47	03	59	12	65
47	48	11	72	33	92	50	06	61	15	67
48	51	14	75	35	94	52	09	64	17	70
49	54	16	78	38	97	55	11	66	20	72
50	56	19	80	41	4200	57	14	69	22	75
51	59	22	83	43	02	60	16	71	25	77
52	62	24	85	46	05	63	19	74	28	80
53	65	27	88	49	08	65	22	77	30	82
54	67	30	91	51	10	68	24	79	33	85
55	70	32	94	54	13	71	27	82	35	87
56	73	35	96	57	16	73	29	84	38	90
57	75	38	99	59	18	76	32	87	40	02
58	78	41	3902	62	21	78	35	89	43	95
59	81	43	05	65	24	81	37	92	45	97
60	84	46	08	67	26	84	40	95	48	5000

The Degrees of the Quadrant.

M.	30	31	32	33	34	35	36	37
2	5002	5153	5302	5449	5594	5738	5880	6020
1	05	55	04	51	97	40	82	23
3	07	58	06	54	99	43	85	25
4	10	60	09	56	5601	45	87	27
5	12	63	11	58	04	48	90	30
6	15	65	14	61	06	50	92	32
7	17	68	16	63	09	52	94	34
8	20	70	19	66	11	55	96	37
9	22	73	21	68	14	57	99	39
10	25	75	24	71	16	59	5901	41
11	27	78	26	73	18	62	04	44
12	30	80	29	76	21	64	06	46
13	32	83	31	78	23	67	09	48
14	33	85	34	80	25	69	11	51
15	37	88	36	83	28	71	13	53
16	40	90	39	85	30	74	15	55
17	42	93	41	88	33	76	18	57
18	45	95	43	90	35	78	20	60
19	48	98	46	93	38	81	22	62
20	50	5200	48	95	42	83	25	64
21	53	03	51	97	44	85	27	67
22	55	05	53	5500	45	88	29	69
23	58	08	56	02	47	90	32	71
24	60	10	58	05	50	93	34	74
25	63	12	61	07	52	95	36	76
26	65	15	63	09	54	97	39	78
27	68	17	66	12	57	5800	41	81
28	70	20	68	14	59	02	43	83
29	73	22	70	17	62	05	46	85
30	75	25	73	19	64	07	48	88

A Table of Sines.

The Degrees of the Quadrant.

M.	30	31	32	33	34	35	36	37
31	5078	5227	5375	5522	5666	5809	5950	6090
32	80	30	78	24	69	12	53	92
33	83	32	80	27	71	14	55	94
34	85	35	83	29	74	16	57	97
35	88	37	85	31	76	19	60	99
36	90	40	88	34	78	21	62	6101
37	93	42	90	36	81	23	64	04
38	95	45	93	39	83	26	67	06
39	98	47	95	41	85	28	69	08
40	5100	50	97	43	88	31	71	11
41	03	52	5400	46	90	33	74	13
42	05	55	02	48	93	35	76	15
43	08	57	04	51	95	38	78	17
44	10	60	07	53	97	40	81	20
45	13	62	10	56	5700	42	83	22
46	15	65	12	58	02	45	85	24
47	18	67	15	60	05	47	88	27
48	20	69	17	63	07	49	90	29
49	23	72	19	65	09	52	92	31
50	27	74	22	68	12	54	95	34
51	28	77	24	70	14	56	97	36
52	30	79	27	73	17	59	99	38
53	33	82	29	75	19	61	6002	40
54	35	84	32	77	21	64	04	43
55	38	87	34	80	24	66	06	45
56	40	89	37	82	26	68	09	47
57	43	92	39	85	29	71	11	49
58	45	94	41	87	31	72	13	52
59	48	97	44	89	33	75	16	54
60	50	99	46	92	36	78	18	56

A Table of Sines.

The Degrees of the Quadrant.

M.	38	39	40	41	42	43	44	45
1	6159	6295	6430	6563	6694	6822	6949	7073
2	61	98	32	65	96	24	51	75
3	63	6300	34	67	98	26	53	77
4	66	02	37	69	6700	28	55	79
5	68	04	39	71	02	31	57	81
6	70	07	41	74	04	33	59	83
7	73	09	43	76	06	35	61	85
8	75	11	46	78	08	37	63	87
9	77	13	48	80	11	39	65	89
10	79	16	50	83	13	41	67	92
11	82	18	52	85	15	43	69	94
12	84	20	54	87	17	45	72	96
13	86	22	57	89	19	48	74	98
14	89	25	59	91	21	50	76	7100
15	91	27	61	93	24	52	78	02
16	93	29	63	96	26	54	80	04
17	95	31	66	98	28	56	82	06
18	98	34	69	6600	30	58	84	08
19	6200	36	70	02	32	60	86	10
20	02	38	72	04	34	62	88	12
21	05	40	74	06	36	64	90	14
22	07	43	77	08	38	67	92	16
23	09	45	79	11	41	69	94	18
24	11	47	81	13	43	71	97	20
25	13	49	83	15	45	74	99	22
26	16	52	86	17	47	75	7001	24
27	18	54	88	19	49	77	04	26
28	20	56	90	22	52	79	05	28
29	23	58	92	24	54	81	07	30
30	25	61	94	26	56	83	09	32

A Table of Sines.

The Degrees of the Quadrant.

M.	38	39	40	41	42	43	44	45
31	6227	6363	6497	6628	6758	6886	7011	7134
32	30	65	89	30	60	88	13	36
33	32	67	6501	33	62	90	15	39
34	34	70	03	35	64	92	17	41
35	36	72	05	37	66	94	19	43
36	39	74	08	39	69	96	21	45
37	41	76	10	41	71	98	23	47
38	43	79	12	44	73	6900	26	49
39	45	81	14	46	75	02	28	51
40	48	83	16	48	77	05	30	53
41	50	85	19	50	79	07	32	55
42	52	87	21	52	81	09	34	57
43	55	90	23	54	83	11	36	59
44	57	92	25	57	86	13	38	61
45	59	94	27	59	88	15	40	63
46	61	96	30	61	90	17	42	65
47	64	99	32	63	92	19	44	67
48	66	6401	34	65	94	21	46	69
49	68	03	36	67	96	23	48	71
50	70	05	39	70	99	25	50	73
51	73	08	41	72	6801	28	52	75
52	75	10	43	74	03	30	54	77
53	77	12	45	76	05	32	57	79
54	79	14	47	78	07	34	59	81
55	82	17	50	80	09	36	61	83
56	84	19	52	83	11	38	63	85
57	86	21	34	85	13	40	65	87
58	89	23	56	87	16	42	67	89
59	91	26	58	89	18	44	69	91
60	93	28	60	91	20	46	71	93

A Table of Sines.

The Degrees of the Quadrant.

M	46	47	48	49	50	51	52	53
1	7195	7315	7433	7549	7662	7773	7882	7988
2	97	17	35	51	64	75	84	90
3	99	19	37	53	66	77	85	92
4	7201	21	39	55	68	79	87	93
5	03	23	41	57	70	81	89	95
6	05	25	43	59	72	82	91	97
7	07	27	45	60	73	84	93	98
8	09	29	47	62	75	86	94	8000
9	11	31	49	64	77	88	96	02
10	13	33	51	66	79	90	98	04
11	15	35	53	68	81	91	7900	05
12	18	37	55	70	83	93	01	07
13	20	39	57	72	85	95	03	09
14	22	41	59	74	87	97	05	11
15	24	43	61	76	88	99	07	12
16	26	45	63	77	90	7801	09	14
17	28	47	64	79	92	03	10	16
18	30	49	66	81	94	04	12	18
19	32	51	68	83	96	06	14	19
20	34	53	70	85	98	08	16	21
21	36	55	72	87	7700	10	18	23
22	38	57	74	89	01	11	19	25
23	40	59	76	91	03	13	21	26
24	42	61	78	93	05	15	23	28
25	44	63	80	95	07	17	25	30
26	46	65	82	96	09	19	26	32
27	48	67	84	98	11	21	28	33
28	50	69	86	7600	12	22	30	35
29	52	71	88	0	14	24	32	37
30	54	73	90	04	16	20	33	38

The Degrees of the Quadrant.

M.	46	47	48	49	50	51	52	53
31	7256	7375	7491	7606	7718	7828	7935	8040
32	58	77	93	08	20	30	37	42
33	60	79	95	10	22	32	39	44
34	62	81	97	12	24	33	41	45
35	64	82	99	14	25	35	42	47
36	66	84	7501	15	27	37	44	49
37	68	86	03	17	29	39	46	51
38	70	88	05	19	31	40	48	52
39	72	90	07	21	33	42	49	54
40	74	92	09	23	35	44	51	56
41	76	94	11	25	37	46	53	58
42	78	96	13	27	39	48	55	59
43	80	98	14	29	40	49	56	61
44	82	7400	16	30	42	51	58	63
45	84	02	18	32	44	53	60	64
46	86	04	20	34	46	55	62	66
47	88	06	22	36	48	57	63	68
48	90	08	24	38	50	58	65	70
49	92	10	26	40	51	60	67	71
50	94	12	28	42	53	62	69	73
51	96	14	30	44	55	64	70	75
52	98	16	32	45	57	66	72	76
53	7300	18	34	47	59	67	74	78
54	01	20	36	49	60	69	76	80
55	03	22	37	51	62	71	77	82
56	05	24	39	53	64	73	79	83
57	07	26	41	55	66	75	81	85
58	09	28	43	57	68	76	83	87
59	11	29	45	58	70	78	85	88
60	13	31	47	60	71	80	86	90

A Table of Sines.

The Degrees of the Quadrant.

M	54	55	56	57	58	59	60
1	8092	8193	8292	8388	8482	8573	8662
2	94	95	94	90	83	75	63
3	95	97	95	91	85	76	65
4	97	98	97	93	87	78	66
5	99	8200	98	95	89	79	68
6	8100	01	8300	96	90	81	69
7	02	03	02	98	91	82	70
8	04	05	03	99	93	84	72
9	05	06	05	8401	94	85	73
10	07	08	07	02	96	87	75
11	09	10	08	04	97	88	76
12	11	12	10	06	99	90	78
13	12	13	11	07	8500	91	79
14	14	15	13	09	02	93	81
15	16	16	15	10	03	94	82
16	17	18	16	12	04	96	84
17	19	20	18	14	06	97	85
18	21	21	19	15	07	99	87
19	22	23	21	17	09	8600	88
20	24	25	22	18	11	02	90
21	26	26	24	20	13	03	91
22	28	28	26	21	14	05	92
23	29	30	28	23	16	06	94
24	31	31	29	24	17	07	95
25	33	33	31	26	19	08	97
26	34	35	32	28	20	10	98
27	36	36	34	29	22	12	99
28	38	38	36	31	23	13	8701
29	39	40	37	3	25	15	02
30	41	41	39	3	26	16	04

A Table of Sines.

The Degrees of the Quadrant.

M.	54	55	56	57	58	59	60
31	8143	8243	8340	8435	8528	8618	8705
32	44	45	42	37	29	19	06
33	46	46	44	38	31	21	08
34	48	48	46	40	32	22	09
35	49	49	47	42	35	23	11
36	51	51	48	43	36	27	12
37	53	53	50	45	37	28	13
38	55	54	52	46	39	29	15
39	56	56	53	48	40	30	16
40	58	57	55	49	42	31	18
41	60	59	56	51	43	33	19
42	61	61	58	52	45	34	20
43	63	63	60	54	46	36	22
44	65	64	61	55	48	37	24
45	66	66	63	57	49	38	25
46	68	67	64	58	51	40	26
47	70	69	66	60	52	41	28
48	71	71	67	62	54	43	29
49	72	72	69	63	55	44	31
50	74	74	71	65	57	46	32
51	76	76	72	66	58	47	33
52	78	77	74	68	60	48	35
53	80	79	75	70	61	50	36
54	81	81	77	71	63	53	38
55	83	82	79	73	64	54	39
56	85	84	80	74	66	55	40
57	86	85	82	76	67	56	42
58	88	87	83	77	68	57	43
59	90	89	85	79	69	59	45
60	91	90	87	80	70	60	46

A Table of Sines.

The Degrees of the Quadrant.

M	61	62	63	64	65	66	67
2	8749	8832	8913	8990	9065	9138	9207
4	52	35	15	93	68	40	09
6	55	38	18	95	70	42	12
8	58	41	21	98	73	45	14
10	60	43	23	9000	75	47	16
12	63	46	26	03	78	49	18
14	66	49	28	06	80	52	21
16	69	52	31	08	83	54	23
18	71	54	34	11	85	56	25
20	74	57	36	13	87	59	28
22	77	60	39	16	90	61	30
24	80	62	41	18	92	64	32
26	83	65	44	21	95	66	34
28	85	67	47	23	98	68	36
30	88	70	49	26	9100	71	39
32	91	73	52	28	02	73	41
34	94	75	54	31	04	75	43
36	96	78	57	33	07	77	45
38	99	80	60	36	09	80	47
40	8802	83	62	38	12	82	50
42	05	86	65	41	14	84	52
44	08	89	67	43	16	87	54
46	10	91	70	46	19	89	56
48	13	94	72	48	21	91	59
50	16	97	75	51	23	94	61
52	19	99	78	54	26	96	63
54	21	8902	80	56	28	98	65
56	24	05	83	58	31	9200	67
58	27	07	85	61	33	03	70
60	30	10	88	63	35	05	72

The Degrees of the Quadrant.

M.	68	69	70	71	72	73	74
2	9274	9338	9399	9457	9512	9565	9614
4	76	40	9401	59	14	66	16
6	78	42	03	61	16	68	17
8	80	44	05	63	18	70	19
10	83	46	07	65	19	71	20
12	85	48	09	66	21	73	22
14	87	51	11	68	23	75	24
16	89	52	13	70	25	76	25
18	91	54	15	72	27	78	27
20	93	56	17	74	28	80	28
22	96	58	19	76	30	81	30
24	98	60	20	78	32	83	32
26	9300	63	22	80	34	85	33
28	02	65	24	81	35	86	35
30	04	67	26	83	37	88	36
32	06	69	28	85	39	90	38
34	08	71	30	87	40	91	39
36	10	73	32	89	42	93	41
38	13	75	34	91	44	95	42
40	15	77	36	92	46	96	44
42	17	79	38	94	48	98	45
44	19	81	40	96	49	9600	47
46	21	83	42	98	51	01	48
48	23	85	44	9500	53	03	50
50	25	87	46	01	54	04	51
52	27	89	47	03	56	06	53
54	29	91	49	05	58	08	55
56	22	93	51	07	59	09	56
58	24	95	53	09	61	11	58
60	36	97	55	10	63	13	59

A Table of Sines.

The Degrees of the Quadrant.

M.	75	76	77	78	79	80	81	82
5	9663	9706	9747	9784	9819	9850	9879	9905
10	67	10	50	87	22	53	81	07
15	70	13	53	90	24	55	84	09
20	74	17	56	93	27	58	86	11
25	78	20	60	96	30	60	88	12
30	81	24	63	99	32	63	90	14
35	8,	27	66	9802	35	65	92	16
40	89	30	69	05	38	68	94	18
45	92	34	72	08	40	70	96	20
50	96	37	75	11	43	72	98	22
55	99	40	78	13	46	74	9900	24
60	9703	44	81	16	48	77	03	25

The Degrees of the Quadrant.

M.	83	84	85	86	87	88	89
5	9927	9947	9963	9977	9987	9994	9998
10	29	48	64	78	88	95	98
15	31	50	65	78	88	95	98
20	32	51	67	79	89	96	99
25	34	52	68	80	90	96	99
30	36	54	69	81	90	96	99
35	37	55	70	82	91	97	99
40	39	57	71	83	92	97	99
45	40	58	72	84	92	98	99
50	42	59	73	84	3	98	99
55	44	60	75	85	93	98	99
60	45	62	76	85	94	98	10000

10000 The

The Extraction of Rootes.

IT is not vnnecessary, before we do enter into this order and method of teaching how to extract a Root to shew the diuers kinds and their definitions: Therefore you must know that of Rootes there are sundry sorts, according to the quantities from which they are deriued, as the Squares, Cubes, Squared squares, Surdsolides, &c. for the numbers receiue their names of the said quantities, euery quantity hauing his Roote, which may be called the first quantity. Because it is the side or beginning of the quantity whereunto it is set: Numbers of the second quantity are called squares of the third Cubes, of the fourth squared squares as before: wherin you may proceed infinitely if you will, but you shall seldome or neuer haue vse for the extraction of the Roote of any quantity more then Squares and Cubes: A Square number is the Product of any number multiplyed in it selfe, and the Roote thereof is the multiplyer whereby the same square number is produced: As for example, 4. is a square number comming of the multiplycation of 2. in it selfe which is the Roote thereof.

A Cubick number is the product of any number multiplied into it selfe, and the same product multiplied againe by the first number: As 2. multiplyed by it selfe is 4. that Product multiplyed againe by 2. the first number makes 8. which is a Cubick number, and the Roote thereof.

A Squared square number, is produced of 3. multiplications, first any number by it selfe makes a square number, that product againe by the first roote or multiplier, makes a Cubick number: and lastly, that product againe by the first figure or roote, produceth a squared square number, as 2. multiplied in it selfe makes 4. a square number, that againe by 2 makes 8. which is a Cubicke number, and then that product againe by 2. produceth 16. which is a squared square number: and the roote thereof is 2. A Surdsolide number is the product of a number multiplyed 4. times by the roote thereof: as 32. is a surdsolide number, the number whereof is 2; for 2. multiplyed in it selfe is 4. that multiplyed againe by 2. is 8. the same product againe by 2. makes 16: and lastly, the same product multiplied by the first number 2. makes 32. there-

fore I conclude that 32. is a surdsolide number, and the number 2. whereby the said number is produced, is the surdsolide roote to the said number: And thus multiplying the last product by the first number or roote, you may proceed infinitely, but more then these are needeles, and as I said before, without any great or common use.

Now for the finding of the roote, it must bee done according to the quantity whereof it taketh Domination, as whether it bee of a Square or Cube, or otherwise: which knowne, let us proceed to the working thereof.

You must understand that the order of extracting the roote of any quantity, is not much unlike to Division, differing onely in this, that whereas in Division the deuisor is knowne, but here it is to finde: also in Division you alwayes keepe one deuisor, but in this, you must change your deuisor at each remouing, which is at the finding of euery figure contayned in the roote: Now therefore I will lay downe one generall way for the extraction of the roote of all quantities what euer, which is done by certaine numbers applyed to each seueral quantity: which are these: For the Square roote in one number required, which is 20. For the Cube two numbers which are 300. and 30. For the Squared Square three numbers, viz. 4000. 600. and 40.

Thus hauing declared the kindes, numbers, quantities, and order of the extraction of all sorts of rootes, it followeth that wee proceede to the practice thereof: And first to extract the Square roote of any number, you must consider as before I haue said, that 20. is the number for the same quantity: Also you must learne by memory the iust Square of all the 9. vnities, which if you know not, this Table will stand in some stead: where you see that against euery of the 9. vnities aforesaid, towards the right hand is ỹ square of that vnity against which it doth stand: which knowne, set downe the number whereof you would extract the square root, then vnder the last figure at the right hand, put a prick, & then proceeding towards the left hand vnder euery second figure put a prick, that done, draw with your pen a quotient as in diuision: Now for to finde the roote of your giuen number, seeke the greatest

1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81

square

Square number contained in the number ouer the first pricke, that Square number take from the number ouer the said pricke, and set the remainer ouer it, the roote of which Square number put in the quotient for the first figure of the roote: that roote multiply by 20. the number for the Square roote: and then looke how often the product thereof may be taken from the number ouer, or to the left hand of the second pricke, which put in your quotient for the second figure of your roote: but this is to be noted for a generall rule, that you must take no greater number for your second figure, then that the Square thereof added with the former product, may be taken from the number ouer the said second pricke: and also looke how many prickes are vnder your giuen number, so many figures must be in the quotient, for the roote of the said number: then hauing found 2. figures, in the quotient, if there be any more prickes, multiply the whole number in the quotient by 20. and seeke how often the product thereof may be taken from the number ouer or belonging to the next pricke, which number, put the in quotient, and adding the Square thereof to the former product, subtract the whole summe from the number ouer the said pricke, and cancelling the said number as at each remoue you must doe, let the remainer ouer it, and if there bee any more prickes vndone, doe as you did before, alwayes multiplying the quotient by 20. thereto adding the Square of the last figure, and the totall summe being subtracted from the last remainer, if there rest nothing, it is a Square number or else not; which you may proue if you multiply the roote by it selfe squarely, for the roote being truely extracted, will produce the first giuen number. But because that examples are easiest for the vnderstanding, let 104976. be the giuen number whereof I would know the Square roote, viz. what number being multiplyed in it selfe, will produce the foresaid number of 104976. Therefore first I set downe the said number, and vnder the last figure towards the right hand, which in this example is 6. I put a pricke or point, another vnder the 9. and lastly another vnder 0. leauing one figure betwixt euery pricke: which done and the quotient drawne the giuen number will stand thus: 104976 | whereby I see that the roote of the said number must consist of 3. figures, because it hath 3. prickes vnder it: then I seeke the

the greatest square number is 10. it being the number belonging to the first pricke toward the left hand, that I find to be 9. which is produced of 3. multiplyed squarely. therefore I put 3. in the quotient for the first figure of the roote, and the square thereof being 9. I subtract from 10. the number ouer the first pricke, and there rests 1. The order of which worke will stand thus:

1
1.04976 | 3
9

where you see that the figures ouer the first prick is cancelled, there is 3. in the quotient for the first figure of the root and 1. rests, which with the figures betwixt it and the next pricke, makes 149. for the number of the second pricke. Now for the second figure of the roote, I multiply 3. the roote already found by 20. and the product is 60. that I seeke how often I may take from 149. the number ouer the second prick, which I may doe 2. times, for two times 60. is 120. whereunto the square of 2. which is 4. being added, makes 124. that subtracted from 149. leaues 25. therefore I put 2. in the quotient for the second figure of the roote, and cancelling the figures ouer the second pricke, the remainer being put ouer it, the working thereof will stand in this order: where you see the quotient is 23. for the two first figures of the roote, and the figures of the two first prickes being cancelled, there rests 25. which with the other figures betwirt them, and the third and last pricke, makes 2576. for the number ouer the last pricke: now therefore, to finde the last figure of the roote, I multiply the roote already found, that is to say 32. 20. and the product thereof is 640. that I seeke how oft it may bee taken out of 2576. the number ouer the last pricke, which may be done 4. times, for 4. times 640. is 2560. whereunto if I adde the square of 4. there will amount 2576. which because it may be taken from the number remaining ouer the last pricke, I put 4. in the quotient for the last figure of the roote, and subtracting the former Product of 5276. from the number ouer the last pricke, which is likewise

1 25
1.04976 | 32
9
124 20
3
60
2
124
4
124
125
1.04976 | 324
9
124
2576.
32
20
2576. there

2576. there will reſt nothing, therefore I cancell thoſe figures likewiſe, and thereby conclude 104976. to be a ſquare number and 324. to bee the roote thereof: the proofe whereof is by multiplying the roote unto it ſelfe ſquarely: for if you multiply 324. by 324. the firſt given number of 104976. will be produced the working thereof will be as above you may ſee.

	640
	4
	2560
	16
	2576
	324
	324
	1296
	648
	972
	104976

This example in my minde, might be ſufficient with often uſe and practiſe to bring perfection in this kinde of Extractions, becauſe that although the ſumme bee neuer ſo great, it is done all by one manner of worke: yet neuertheleſſe, if I did not thinke that thou wouldeſt complaine rather of tediouſneſſe of learning, then of the difficultie in teaching, I would giue another example: for varietie of examples makes the worke ſeeme the more eaſie. Therefore once againe: let 548730625. be a given number, whereof I would know the Square roote, firſt I put pricks or points vnder the given number in ſuch order as you ſee, beginning at the laſt figure towards the right hand, and proceeding towards the left, leauing one figure vnpointed betwixt euery pricke, where you ſee that the whole given number conſiſt of 5. prickes, therefore of ſo many figures muſt your roote or quotient be: then drawing a quotient, I ſeeke the greateſt Square number in 5. which is the number ouer the firſt pricke, which greateſt Square number I finde to be 4. and the root thereof 2. for two times 2. is foure, therefore I put 2. in the quotient and taking 4. the ſquare thereof from 5. the number ouer the firſt pricke, there will reſt 1. which I ſet ouer 5. cancelling the ſaid 5. the worke whereof will ſtand as a-

548730625	2
4	

gainſt: then for the ſecond figure of the roote I multiply 2. the firſt figure of the roote already found by 20. and the product is 40. that I ſeeke how often may bee taken from 148. the number remaining ouer the ſecond pricke, which may bee done 3. times, for three times 40. is 120. whereunto the ſquare of 3. being

added makes 129. then I put 3. in the quotient for the second figure of the roote, and subtracting 129. the last product from 148. the number remaining ouer the second pricke, there will rest 19 which with the other figures betwixt them and the next prick, makes 1973. therfore I cancell the 148. and setting the remainer ouer it I haue 1973. for the number ouer the third prick, and 23. in the quotient for the 2. first figures of the root: now for the third figure of the roote: I multiply 23. the root already found by 20. the product is 460. which may be taken from 1983. the number remaining ouer the third pricke 4. times for 460. multiplyed by 4. makes 1740. whereunto adding 16. the Square of 4. the product is 1856. therefore I put 4. in the quotient for the 3. figure of the root, & subtracting 1856. from 1973. the number ouer the third pricke, there will remaine 117. which with the other figures betwixt them and the next pricke, makes 11706. for the number ouer the fourth prick, and there is in the quotient 234. for the roote already found the whole worke standing as aboue: Againe, for to finde the fourth figure of the roote, I multiply 234. the roote found, by 20. the product whereof is 4680. which may be taken out of 11706. two times, for 4680. multiplied by 2. makes 9360. which with 4. ẏ Square of 2. makes in all 9364. the same being subtracted from 11706. the number remaining ouer the fourth pricke, there will rest 2342. which with the other figure betwixt them and the fifth or last pricke; makes 234225. for the number remaining ouer the last pricke, therefore making my subtraction, I set the remainer ouer it, and put 2. in the quotient for the fourth figure of the roote, as you may see in the margine: then to find the last figure of the root of this giuen number aforesaid, I multiply the whole roote alreadie found, viz. 2342. by 20. the Product is 46840. which may bee taken from

```
 ~~1~~19
548730625   |234
 .  .  .  .
 4
 ~~1~~29
```

```
      1
 ~~11~~917
548730625   |234
 .  .  .  .
 4
 129
     1856
```

```
   123
 ~~11~~91742
548730625   |2342
 .  .  .  .
 4
 129
   1856.
      9364
```

234225. the

234235. the number ouer the laſt prick 5. times, for 46840. multiplyed by 5. makes 234200. wherunto if I adde 25. the Square of 5. the whole product will be 234225. which number is equal to the number ouer the laſt pricke, therefore I put 5. in the quotient, for the laſt figure of the roote, and ſubtracting the whole ſumme of the laſt product, viz. 234225. from the number ouer the laſt point or prick, which is likewiſe 234225. there will remaine nothing, whereby I finde 54873625. the giuen number to be a Square number and the roote thereof to bee 23425. which is the number found out in the quotient, as in the working thereof you may more plainely perceiue.

For proofe whereof if you multiply 23425. the root ſquarely into it ſelfe, the product thereof will be equall to the firſt giuen number.

I doubt not but to any indifferent conceit theſe two examples will ſuffice as well as if I ſhould contriue a whole volume thereof when it is ſo that the giuen number is a right Square number, but if the giuen number be not a Square number it is impoſſible for to finde an exact roote thereto, but that after the worke there will remaine ſomething as a fraction or part of a number more to bee added to the quotient: for the true and perfect valuation of which fraction or remainer, none as yet could attaine, but they haue ſet downe ſo neere a way for the extraction of the roote of any number not being a Square number, that thereby no great error may be perceiued: For the knowledge and better vnderſtanding of which, let this be a familiar example: you know that 16. is a right Square number, and the Square roote thereof is 4. but if you would extract the Square roote of 18. you ſhould haue 4. in your quotient likewiſe for the roote thereof, but then there will reſt 2. whereby you ſee that 18. is no Square number, neither can you know what fraction to make of it, by reaſon that you haue no certaine deuiſor which might ſtand for Denominator to the Numerator or remainer: onely let this ſuffice, that to finde the neereſt roote thereof, the rule is thus: double the remainer for the Numerator and quadruple; viz. multiply the roote by 4. and thereto adde 1. for the Denominator to the ſaid Numerator as in this example to extract the neereſt Square roote of 18. I finde 4¼ to bee

18 | 4¼
16

in

in the quotient, and 2. remaining, which 2. being doubled makes 4. for the Numerator, and 4. the roote being multiplyed by 4. makes 16. and 1. added therewith, makes 17. for Denominator, whereby I say that 4. 1/17. is the nereſt Square roote of 18. which may bee found out, for if you reduce 1/17. into one common Denomination, and then multiply them ſquarely, the product will be 17. 16/17. which is but 1/17. too little.

Thus having declared the order how to extract the Square root of any number: It reſteth now that I ſhew the manner of extracting the Cube root of any number: as for the principall uſes thereof, you ſhall find in the generall practiſe of the Mathematickes.

To find out the Cube roote of any giuen number, being a right Cube number, firſt put downe the giuen number, and as in the Square number you put points or pricks: beginning at the right hand and ſo towards the left, leauing betwixt each point one figure void, ſo in the extraction of the roote of a Cube number, you muſt leaue two figures void or vnpricked betwixt euery point, and as in the Square roote, ſo likewiſe in this: looke how many points are vnder the giuen number, ſo many figures muſt bee contained in the roote thereof, which is alſo to be obſerued in extracting the roote of any quantity whatſoeuer: theſe things being conſidered, it is alſo neceſſary, that you know the greateſt Cubick number of euery of the 9. vnities, whereof the Table hereunder ſpecified maketh explanation: where you ſee that againſt each vnity ſtandeth the Cube number thereof, which being knowne, and the giuen number pricked, with a quotient drawn as before I haue ſhewed: to extract the Cube root, you haue 2. numbers, viz. 300. & 30. but becauſe the working thereof would be too long to expreſſe in tearmes let 13824. be a giuen number, whereof I would extract the Cube roote.

1	....	1
2	....	8
3	....	28
4	....	64
5	....	125
6	....	216
7	....	343
8	....	512
9	....	729

First I put down that number aforeſaid with points vnder it, and a quotient in this order, 13824. whereby I ſee that the roote thereof muſt conſiſt of two figures, becauſe ſo many points doe belong vnto the giuen number; for the firſt figure whereof I ſeeke

the

the greatest Cube number contained in 13. the number ouer the first point towards the left hand, which I finde to be 8. the Cube roote thereof, which is 2. I put in the quotient for the first figure of the root and subtracting 8. from 13. rests 5. which I put ouer 13. cancelling the said 13. which done, the worke will be as below.

Now for to finde the second figure of the root, I set downe the 2. numbers which serueth for the extraction of the Cube root, viz. 300. 30. and against 30. I put the roote already found, which is 2. and against 300. the square thereof, which is 4. these two figures I set towards the left hand of them, then I multiply 300. by 4. the figure which standeth against it, and the product is 1200. that I seeke how often I may take from 5824. the number ouer the second pricke, which I may doe foure times, therefore I put 4. in the quotient for the second figure, and vpon the right hand against 300. I set 4. the last found number in the quotient, and against 30. I put 16. the square thereof: and vnderneath 30. I put 64. which is the Cube of 4. then multiplying all the figures which are in a row into one product, viz. 4. by 300. makes 1200. and that againe by 4. makes 4800. for that product: then for the next, 2. by 30. makes 60. and that by 16. makes 960. for the second product, which I set downe together each vnder other. Lastly, because 64. hath no other number to be multiplyed therewith, I put that downe vnder them, which done, I adde them all together, and ỳ totall summe is 5824. the same subtracted from the number ouer the last pricke, leaueth nothing, whereby I see that 13824. is a Cubick number, and the Cube roote therefore is 24. as you may more plainly see by the working thereof, which is put in the margine above, where you see that 24. being

5		
13824	2	
8		
4 300	4	
2 30	16	
62		300
		4
30		
2		1200
		4
60		
16		4800
360		
60		
960.		4800
		960
		64
		5824

24. being multiplyed into it selfe, and that product againe by 24. the first multiplyer, the product is 13824. which is equall to the first giuen number.

Againe, seeing that examples are the easiest method of teaching and plainest for vnderstanding: let 12551868224. bee a giuen number: whereof I would extract the Cube roote: First hauing prickt it and drawne a quotient for the roote, thus 12551868224. I see that the roote must consist of 4. figures, so many prickes being vnder the giuen number. For the finding of which figures, I seeke first the greatest Cube number, in 12. which is 8. the root whereof being 2. I put in the quotient, for the first figure of the roote subtracting 8. the Cube thereof, from 12. the number ouer the first pricke, rest 4. then for the second figure of the roote I put downe 300. and 30. the numbers for the Cube roote, against 30. I set 2. the roote found: and against 300. 4. the Square thereof: and multiplying 300. by 4. the Product is 1200. that may be taken out of 4551. the number ouer the second pricke 3. times, therefore I put 3. in the Quotient, and likewise after 300. and the Square thereof which is 9. after 30. and the Cube thereof which is 27. I put vnder 30. then I multiply all the numbers in the first rowe, each by the other, viz. 4. by 300. makes 1200. and the same Product againe by 3. makes 3600. which I set by it selfe: then againe I multiply 2. by 30. is 60. and that againe by 9. makes 540. which I put vnder the other Product; Lastly, because 27. hath no number wherewith 3600. to be multiplyed, I set downe likewise vnder both the other, and the 3. numbers being set in order one vnder another, as you see I adde them altogether, and the whole Product is 4167. the same I subtract from 4551. the number ouer the next pricke, 4167. and there will remaine 384. to joyne with the number

```
5824     24
          24
          ---
          96
          48
          ---
         576
         ---
         576
          24
         ----
        2304
       1152
       -----
       13824
```

```
4
12551868224 | 23
8
```

```
300    3
30     9
27
```

```
3600.
540
 27
----
4167.
```

ber ouer the 3. pricke: which done the worke will stand in this order as you see.

Now for the third figure of the roote I put down 3000. and 30. as before, & against 30. at the left hand, I put 23. the roote already found, and against 300. the Square thereof, which is 529. then multiplying 529 by 300. the Product is 158700. which may be twice taken from 384868. therefore I put 2. in the Quotient for the third figure of the roote, and likewise put 2. to the right hand of 300. and the square therof which is 4. at the right hand of 30. and the Cube thereof being 8. I put vnder 30 which numbers will stand as aboue; then multiplying all the numbers in one row each by other, into one Product, viz. 529. by 300. makes 158700. and that againe by 2. is 317400. for the whole Product of that rowe which I set downe by it selfe; then I multiply 23. by 30. is 690. and that againe by 4. is 2760. for the Product of the second row.

```
  4284
 12551868224|23
8
 4167
   529.        300
     23         30
```

Lastly, because 8. hath no number with it, I put it downe vnder the other, and then adding all the three summes together, the product is 320168. the same taken from 384868. the number ouer the third pricke, rests for the number ouer the last pricke, 64700224. and in the Quotient, is 232 the whole worke being as you see aboue.

```
                320168
        6
   4384700
 12551868224|232
8
      4167
            320168
```

Now to find the fourth and last figure of the root, I put downe the two numbers againe which serue for the Cube roote, viz. 300. and 30. At the left hand of 30. I put 232. the numbers in the quotient, and at the left hand of 300 I set this square of 232. which is 53824. in this order: Then multiplying 53824. by ye product, is 16147200. which I seeke how often may be had in 64700224. the numbers remaining ouer the last pricke, that may be done 4. times: Therefore I put 4. in the Quotient, for the fourth and last figure of the roote, and also I set the said 4. at the

```
53824
  232
```

right

right hand of 300. and the square thereof which is 16. at the right hand of 30. and the Cube thereof being 64. I put right vnderneath 30. which done, all the numbers will stand as aboue: Then multiplying all the numbers in each row, into their seuerall products, viz. 53824. by 300. makes 16147200. that again by 4 is 64588800 which I set by it selfe; Then againe, 232. by 30. is 6960. the same Product by 16. makes 111360. which I put downe vnder the other.

53824...300..4
232...30..16
64

Lastly, because 64. hath no other number to be multiplied therewith, I put it downe likewise, vnder the other two numbers, and adding the three products together, the whole summe thereof will be 64700224. which being subtracted from the number remaining ouer the last pricke, leaues nothing: So haue I in the Quotient 2324. for the Cube root of 12551868224. the giuen number: the whole worke whereof, is here set downe in the Margine. For the proofe whereof if you multiply the roote: viz. 2324. Cubickly in it selfe, the Product thereof will be equall with the first giuen number, as for example you may see in the working.

Where you see, that 2324. the root being multiplied into it selfe squarely, and then likewise the whole Product thereof againe by the same roote, 2324. The totall summe amounting thereof, 12551868224. is the first giuen number.

But when you haue a number giuen to extract the Cube roote, and the foresaid giuen number be not a right Cube number, whereby you cannot come to any perfect root therof, but that there will remaine some fraction or broken number after your said extraction, only the manner to extract the nearest root of a number not Cubicall, as most writers doe affirme, is thus:

12551868224.

The difference betwixt the Cubicke number of the root, and the Cubick number of a number more then the root, by an vnity shalbe the Denominator to the remainer, 1. added also thereto:

As for Example: Let 12. be a number giuen, which not being a right Cube number I would find the nearest root thereof? First the greatest Cubick number in 12. is 8. the Cube root whereof being 2. I put in the quotient, and subtracting 8. the Cube thereof from

from 12. there will reſt 4. which 4. being ouer, ſheweth ỹ 12. is no Cubick number; therefore adding 1. to 4. makes 5. which I put for the Numerator: and to find the Dominator thereto, I ſet downe the Cube 2. the root found, which is 8. and likewiſe 27. the Cube of 3. which is a number more then the root by 1. then ſubtracting the one from the other, viz. 8. from 27. leaues 19. for the Denominator: By which reaſon the neareſt Cubick root of 12. is $\frac{5}{19}$. which being reduced, and multiplyed Cubickly, makes 11. $\frac{4858}{6859}$. the ſame abbreuiated, makes 11, and very néere $\frac{1}{2}$. and it ſhould be 12. therefore ỹ erro: is $\frac{1}{2}$. too little, which although in this is no great erro:, yet in a great ſumme the erro: would be very much: Therefore for thoſe which deſire a more exact & perfect extraction of the ſquare or Cube roote from numbers not being right ſquare or Cubick numbers: Walker Record in his Whetſtone of wit, ſetteth downe an exact way (but being tedious) which is thus: For the ſquare roote adde to the giuen number ſo many times 2. Ciphers, as you deſire the nærneſſe of the roote: And for the Cubicke root ſo many times 3. Ciphers, as you deſire the exactneſſe of the root thereof: and vnder the ſaid Ciphers, put pricks in ſuch order as before is taught: and then marke how many prickes there is ouer and beſides the pricks of the giuen number: and then extract the root from all thoſe Ciphers in ſuch order as you did before: for if there be 1. more, the roote ſhall be tenths and the remainer parts of $\frac{1}{10}$. if there be two points or pricks ouer, more then the giuen number, then the root ſhall be hundreths, and the remainer parts of $\frac{1}{100}$. if 3. pricks be ouer, the root ſhall be thouſands and the remainer parts of $\frac{1}{1000}$: and ſo you may come to a very néere roote, but not to any exact or perfect roote, vnleſſe the giuen number be a right ſquare or Cubicall number.

A Declaration of the Tables of Longitude and Latitude of places following.

The Tables hereafter following, ſhewing the Longit. and Lat. of places, viz. of Kingdomes, Prouinces, Cities, Iles, Capes, Bayes, Riuers, and Mountaines, eſpecially the moſt principall of them

them in the whole world, are gathered from the latest Descriptions, Maps and Charts, as well vniuersall as particuler: who albeit they differ greatly in Longitude, yet in Latitude most of them agree: and also hauing a respect to the beginning of each of their seuerall Longitude, they come all to a neare agreement: For some beginning their Longitude at the Westermost part of Africa, makes the Longitude of London to be about 10. degrees. 20. minutes: others beginning at the Canary Ilands, makes the Longitude of London 18. degrees: others more Westward make 19. degrees 30. min. and Iodocus Hondius beginning the Meridian at the Ile Pico, one of the Azores, makes London to be in Longitude 27. deg. 40. min. but I following M. Emery Mu'ineux, according to his great Globes, doe account the Longitude from the Westermost parts of St. Michaels, another Ile of the Azores, the midst of which Ile is 50. min. in Longitude, and from the Westermost part thereof, the Longit. of London is 25. deg. 40. min, which in effect is not much different from any of the others: Note that the Longitude is counted from the Meridian passing ouer the aforesaid place Easterwards into a continuall progression, to the end of 360. which is the whole Circumference of the world. Latitude is counted from the Equinoctiall to the end of 90. deg. on each side therof: and where the letter S. is after any number, it shewes the place to haue so many degrees and minutes of South Latitude, all the rest hauing no letter adioyning, haue North Latit. the whole being set in Alphabeticall order for the readier finding of any place therein contained: and where the Longitude and Latitude of any Kingdome is set downe, noted by this sillable Rex, it expresseth the middle therof, Further, at ỳ end of such places as begin with one Letter, is left a space wherein the Traueller may insert such places, whereof the Longitude and Latitude is to him knowne, and not herein expressed.

A Table

A Table of the Longitude and Latitude of all the Notable places of the World.

A	Longit.		Latit.		
A					
ACupulco	276	1	18	1	
Acartij an Il.	329	1	52	1	
Azores an Iland	357	1	39	1	
Achaguas	101	30	5	30	S
Achin	132	30	4	40	
Aden	75	12	13	1	
Adia	50	11	25	1	S
Adu	105	41	5	41	S
Ægypt	64	3	30	1	
Africa Reg.	40	1	10	1	
Agonata	162	21	38	1	
Agragam	144	29	8	21	S
Aguada ſegura	253	29	24	1	
Aqua la de pozos	245	20	28	0	
Alina a mountain	98	41	54	20	
Alacranes	283	5	22	1	
Alagoa	58	41	29	41	S
Albion noua	235	1	50	0	
Albiron	109	29	25	29	
Alboram	25	29	35	29	
Albrough	26	25	52	20	
Alepo	72	29	38	1	
Alcada	23	4	40	29	
Alexandria	65	1	31	21	
Alexandria	106	11	36	21	
Algaziu	16	0	29	1	
Algiery	33	1	35	21	
Algueſcet	63	41	26	51	
Alicante	28	41	39	1	

A	Longit.		Latit.		
Alicoa	7	41	13	31	S
Alicur	44	21	38	29	
Alima	108	51	31	1	
Alleluia	70	21	10	1	
Almedina	34	1	33	41	
Alpes a mountain	41	29	47	29	
Alligubas	147	11	38	41	
Amazen	45	29	12	41	
Amazons Reg.	323	1	13	1	
Las Amazona	312	29	12	29	S
Ammon	59	41	27	11	
Amſterdam	33	1	51	29	
Auerie a mount	116	0	54	9	
Ancona	63	11	1	11	
Ancona	43	29	43	51	
Amboina	161	54	3	20	
Abona	164	30	6	10	S
Amiona	75	20	12	40	S
Andernopoly	58	11	44	41	
S. Andre	170	29	12	1	
S. Andre	22	11	6	21	
S. Andreas	62	11	61	11	
Las a negadas	296	0	50	1	S
Angier	24	41	47	35	
Angleſey	19	51	54	0	
Angiia Reg.	23	0	53	0	
Angoleſme	27	1	46	0	
Antiochia	300	50	6	40	
Antipara	74	20	25	20	S
Antwerpen	31	20	50	30	

A B	Longit.		Latit.		
Arabia felix	83	0	21	0	
Arabia deſart	77	0	30	0	
Armenia Reg.	76	0	41	0	
Amoltus mount	35	0	11	30	S
Aſcention	353	20	18	50	
La aſcention	15	30	8	0	S
Aſiria Reg.	85	0	36	0	
Athens	56	10	40	0	
Auero	17	30	41	10	
Auguſtine	293	0	29	50	
Ausbourg	38	40	48	30	
Azuraa mountain	59	0	22	40	
Amiens	28	30	49	40	
B					
BAntam	140	0	5	40	S
Babylon	82	20	33	0	
Babell mandell	80	0	12	50	
Bachu	88	50	42	0	
Bactriana Reg.	115	0	38	30	
Bagaſus a lake	77	10	50	40	
Baharam an Ile	87	20	27	30	
Bayes					
Bay anegada	319	50	40	20	S
Bay de baxos anegados	321	30	39	50	S
Bianza	149	25	3	0	S
Batauia	123	0	3	20	S
Bay a dalagoa	56	10	32	10	S
Bay de fumos	240	20	36	0	
Bay de S. Migell	39	30	8	40	
Bay ocſinora	312	30	41	0	
Bay de plinos	233	0	44	30	
Bay langos	18	0	37	30	
Bacalaio	335	44	8	28	
Bayona	17	20	42	10	
Bayone	25	30	44	0	

B	Longit.		Latit.		
Balſera	82	40	31	10	
Bambreg	39	15	50	10	
Bandu	173	30	33	0	
Bax de los pergos	345	30	20	0	S
La Barbada	192	50	1	50	S
Barlingas	16	20	39	30	
Barnagoſſos Reg.	70	0	13	0	
S. Bartholome	194	30	14	0	
Baſell	37	10	47	50	
Beciaſa	65	0	10	30	
Beil	76	15	27	10	
Belef	69	0	51	40	
Beliſſe	21	40	47	0	
Belt	52	30	50	0	
Bengala Reg.	116	0	26	30	
Benichao	136	0	3	50	
Benin Reg.	41	0	74	0	
Bepirus a mount	143	0	34	0	
Bepirus a Riuer	138	20	34	0	
Berga	40	10	62	50	
Bergeh	30	30	60	50	
Barwick	22	50	55	50	
Bethle	38	50	25	40	
Baiſer Reg.	50	0	4	0	
Braligrod	58	20	47	30	
Bilbao	23	30	43	0	
Blaskey	12	0	51	40	
Blaues	31	10	42	0	
Blauet	21	15	47	50	
Bloe	5	30	67	0	
Borneo	131	30	5	10	
Bornt holm	40	50	55	30	
Boue ibergen	34	20	56	30	
Bra denberg	42	30	52	50	
Braſil	5	10	51	20	
Brallia Reg.	345	0	10	0	S

BC	Longit.		Latit.		
Braua	74	30	0	30	
Breſt	20	0	48	30	
Bruage	25	30	45	50	
Bruges	29	0	51	10	
Buda	48	0	47	20	
Burdiaux	26	0	45	10	
Briſtowe	22	50	51	35	
Brachipult point in Wales	21	25	53	0	
Bachapto	31	0	59	50	
Bruſſels	30	50	51	0	
Barcelona	28	15	41	10	
Burlings	16	0	39	38	
C					
Capes					
Cape S. Francis	335	0	48	5	
Cape Rato	334	40	46	28	
Cape Maſſiſaco	24	0	43	32	
Cape de las penes	21	0	43	35	
Cape de Alinde	346	50	1	0	
Cap de Amber	85	30	12	0	S
Cap de S. Anton	289	15	22	50	S
Cap Cleare	14	10	51	9	
Cap de S. Antoni	74	30	17	0	S
Cap de S. Auguſt	162	0	6	30	
Cap de S. Auguſt	354	0	8	30	S
Cap baxo	328	0	4	20	
Cap de las baxas	19	41	15	29	
Cap Bedford	320	1	65	29	
Cap blanco	273	19	25	21	
Cap blanco	281	19	10	29	S
Cap blanco	331	21	4	26	
Cap blanco	334	21	52	1	
Cap blanco	289	41	2	21	S
Cap blanco	151	1	22	41	

C	Longit.		Latit.		
Cap braua	275	1	27	29	
Cap de breton	331	1	45	41	
Cap cameron	287	21	25	41	
Cap comerin	115	15	7	30	
Cap Cantin	17	1	32	11	
Cap de S. Cather	41	1	1	1	S
Cap de cro	31	29	42	11	
Cap croce	65	21	48	21	
Cap de fierto	281	21	29	21	
Cap deſperance	324	29	51	1	
Cap des domingo	315	21	46	41	S
Cap falſo	41	31	34	40	S
Cap feare	305	11	32	29	
Cap felix	84	29	14	11	
Cap finis terre	16	1	43	11	
Cap Florida	293	21	25	29	
Cap formoſo	28	1	5	1	S
Cap froward	302	39	53	21	
Cap de gato	26	39	36	51	S
Cap de S. Helena	326	11	36	11	
Cap de ſantiago	309	1	37	29	
Cap S. Iohn	62	29	67	29	
Cap de Krin	13	1	53	41	
Cap de S. Maria	77	29	24	1	S
Cap de Maio	82	52	15	51	S
Cap de S. Maria	327	11	35	11	S
Cap de S. Maria	9	41	21	41	
Cap de la Mola	36	51	6	29	
Cap de nombre de Ieſus	308	11	53	1	
Cap ortegall	18	20	44	11	
Cap de palmas	348	11	1	19	S
Cap S. Paul	32	0	5	50	
Cap de peſcadores	277	40	28	0	
Cap del plate	352	50	5	0	S
Cap primero	42	30	2	20	S

C	Longit.		Latit.		
Cap de 3. points	28	30	50	20	
Cap de puntas	315	20	10	40	
Cap daduillius	42	15	34	30	
Cap de Razo	334	30	46	20	
Cap ſalida	74	0	26	10	S
Cap deſpigiel	353	20	7	20	S
Cap de ſtauola	12	20	54	0	
Cap Torriga	11	30	18	20	
Cap la vela	305	10	51	50	
Cap S. Vincent	302	20	53	40	S
Cap de Virgin M.	308	0	52	10	S
Cap de vittoria	297	30	52	0	S
Cap paſſaro	46	29	36	51	
Cap refalgate	96	21	22	21	
Cap raſo	217	41	8	0	
Cap roxent	16	29	18	51	
Cap roxo	11	1	12	0	
Cap of good hope	39	29	34	40	S
Cap del ſpirito ſan	161	11	13	11	
Cap S. Vincent	17	0	37	0	
Cap Verd	9	51	14	20	
Cap de bona veſta	334	21	49	11	
Cap Walſingham	321	1	63	41	
Campon Reg.	136	1	47	0	
Cairo	67	29	30	0	
Calamita	67	41	48	10	
Caldy	20	1	51	40	
Calecut	112	41	10	29	
Calice in france	29	10	50	40	
Calibia Reg.	42	10	36	20	
California	245	0	30	0	
Camanor	300	20	16	30	S
Cambaba	150	0	8	10	S
Cambaya	102	0	22	28	
Camboya Reg.	142	20	11	40	
Capiapa	304	50	34	0	S

C	Longit.		Latit.		
Caſma riuer	121	40	61	0	
Caſtrum portugal	57	10	20	20	S
Cazan	86	20	56	30	
Chaga	56	0	6	20	S
Chialo	56	20	7	0	S
Chilimazata	294	30	6	30	S
Chio	58	30	40	30	
Chiguiſamba	305	30	17	0	S
Coale	65	0	21	30	
Coila	48	20	3	10	S
Cora	85	10	19	20	
Coronades	296	30	45	0	S
Corpo ſanto	84	10	7	30	S
Cumana	313	30	7	0	
Cuſco Reg.	297	20	13	30	S
Cales in Spaine	20	51	36	10	
Cambalu	161	11	51	40	
Canada	305	11	50	21	
Canaria	9	29	27	21	
Canda	59	29	35	21	
Caribes	316	11	7	0	
Cartagena	300	111	20		
Cartagena	28	21	38	20	
Cartago	299	29	3	11	
Caſena Reg.	38	21	17	11	
Caſſer Reg.	132	1	47	1	
Cataio Reg.	150	1	53	1	
Catnes	22	9	58	29	
Catwicke	41	11	59	11	
Cheſter in Eng.	21	29	53	51	
Chicheſter	24	11	51	0	
Chidlies cape	326	41	67	29	
Chily Reg.	305	0	30	1	S
Chirman Reg.	96	0	26	29	
Cirena	53	29	32	0	
Cypres	68	4	37	10	

CD	Longit.	Latit.
Clearmont	30 55	45 51
Cocas a mountain	79 0	47 29
Cochin	114 0	9 14
Callao Reg.	310 0	16 0 S
Colmogory	62 41	63 41
Colne	34 0	51 41
Commania Reg.	86 0	51 0
Congu	147 21	49 11
Coninxberg	49 11	55 29
Conſtantinople	61 10	44 40
Copen hage	38 29	55 51
Coraſau Reg.	108 1	37 0
Corke in Ireland	15 41	51 41
Corſuan Iland	22 0	39 29
Corinth	54 21	39 0
Corſica	38 11	42 0
Corum Reg.	230 0	51 0
Cracow	48 29	50 0
Cuba	296 0	31 41
Earle of *Cumberlands* Iles	316 0	63 21
Cuſitan Reg.	87 0	32 0
Conough	15 35	53 45
Cambridge	25 50	52 14
D		
DAngali Reg.	78 0	11 0
Diu	97 3	20 42
Damon	98 8	19 20
Dabol	98 6	17 45
Dawina	74 30	62 10
Dageroort	48 41	59 41
Dalacia	77 0	14 21
Damaſcus	74 29	33 0
Dantzicke	46 0	55 0
D. *Dareses* Ile	327 51	68 21

DE	Longit.	Latit.
Derwinda	47 51	57 29
Deuenter	33 25	51 51
Diep	28 41	49 29
Dires cape	321 29	64 51
Dominica	319 41	14 0
Don a riuer	75 0	53 21
Donecz a riuer	71 0	51 0
Dorow	58 0	51 29
Douer	28 11	51 0
Dublin	16 41	53 11
Dumaran	150 0	8 41
Duy	34 29	59 21
Duyhe	56 29	50 29
Dams ſtraights	324 1	64 0
Darby	24 5	52 55
Dunkerke	29 10	51 12
E		
EBaida	60 1	25 29
Edenbrough	22 1	55 51
Ely	25 20	52 40
Elior	26 20	10 10
Queen *Elizabeths* forland	337 0	61 30
Emden	34 10	53 10
Ens	43 0	48 30
Ens	74 10	37 30
Epheſus	60 30	39 40
Ergas	86 0	38 0
Euboya	56 10	41 0
Euphrates	76 40	40 0
Europa Reg.	55 0	51 0
Exeter	22 10	50 0
Enchuiſen	21 40	52 54
F		
FAlſterhood	40 0	56 0
Famigoſta	69 20	57 30

FG	Longit.		Latit.		
Farrollones	294	20	11	40	S
Fargana	114	40	46	0	
Farre	16	20	61	30	
Cap fatache	86	50	15	40	
Faſo	75	50	45	40	
Farnaſa	38	10	30	10	
Fernandobuck	351	40	9	20	S
Fees Reg.	21	50	32	50	
Fierro	6	20	26	30	
Finmarke	47	0	69	30	
Flambrough head		20	54	0	
Flensburg	36	40	55	0	
Fleccory	32	0	58	0	
Flye	32	0	53	33	
Florence	41	10	43	40	
Flores Iland	353	40	39	20	
Florida Reg.	292	0	31	0	
Flocen	38	40	46	30	
La formanos	310	30	60	40	
Formentera	31	10	38	50	
Forteuentura	11	0	28	0	
Foyle	15	50	55	30	
Frailes	314	30	11	20	
Franckfort	36	30	50	0	
Friſland	351	30	62	0	
Forbiſhers ſtrait	331	20	64	0	
A furious ouerfall	322	30	60	0	
Farre Ilands	20	0	62	10	
Farnill Ile	24	45	60	0	
Ferando	146	0	32	35	

G	Longit.		Latit.		
GAgo Reg.	25	0	8	30	
Galathia	37	20	37	0	
Gambra a riuer	12	0	13	10	
Gane	30	20	50	40	
Garamantica	51	30	16	0	
Garneſey	22	20	49	40	
Gaza	70	50	33	10	
Gamba	64	40	17	30	S
Gargiza	72	40	12	0	S
Gemenacota	118	40	6	0	
Geneua	33	40	46	20	
Genua	37	50	45	0	
Genua	15	20	16	0	
Gerguth Reg.	153	0	57	0	
Germanarco	40	0	51	0	
Getſeluin	24	30	32	20	
Genera	7	30	26	30	
Ghir a riuer	25	30	22	0	
Giamber	18	1	33	41	
Gilberts ſound	326	51	67	1	
Giras a riuer	41	21	20	11	
Galloway	15	49	53	15	
Goa	102	21	15	14	
Gloſgow	29	0	57	0	
Golfo de benngal	125	0	15	0	
Golfo de S. Helen	48	41	33	29	S
Golfo de la India	44	21	3	14	S
Golfo de los negi	350	30	2	0	S
Golfo del Rey	40	41	5	30	S
Golfo de todos Santos.	345	30	1	41	
Golfo de S. Anto.	46	20	26	0	S
Golfo frio	45	30	20	0	S
Goteland.	45	21	57	30	
Gozo	58	20	34	41	
Granda	318	20	11	0	
Granata	23	30	38	0	
Grecia Reg.	54	0	10	0	
Gratioſa	357	30	29	2	
Groninghen	32	11	53	0	
Groenland	0	0	75	0	

GH	Longit.		Latit.		
Groy	21	0	47	21	
Guinea noua	80	0	5	0	
Guinea Reg.	18	0	9	0	S
Gunagona	67	30	6	0	
Gibralter ſtraight	21	30	35	2	
H					
HAles Iland	337	30	63	0	
Haliber	78	41	21	10	
Halicz	52	51	48	41	
Hambrough	37	11	53	21	
Hartlepoole	24	0	55	21	
Harwich	27	29	52	0	
Hauana	292	11	20	0	
Hebrides	15	20	58	0	
Heidelberg	36	0	49	0	
Heiſt	23	29	46	29	
Heiſhant	19	29	48	41	
Heptapolis	324	29	25	21	
Hercules pillars	69	21	32	11	
Helichland	33	51	66	0	
Hercania Reg.	100	0	40	0	
Hiſpania Reg.	25	0	40	0	
Noua Hiſpania	280	0	13	29	
Hiſpaniola	306	0	18	29	
Holindall	36	11	51	1	
Hontſoorr	48	30	59	1	
Horne	12	10	66	10	
Hull	25	21	53	41	
Hungaria	50	0	48	1	
Hidaſpes a riuer	124	0	33	21	
Hipaſis a riuer	124	0	33	1	
Helin head	15	0	55	15	
Hereford	12	38	52	12	
Heel of Danthick	46	10	55	40	

I	Longit.		Latit.		
I					
IAmbic	121	30	1	15	S
Iacatra	123	24	6	0	S
Iamaica	238	29	7	1	
Iaſques in Perſia	44	0	25	40	
Iapan	169		38	0	
Iarſey Iland	23	0	49	20	
Iaua maior	140	0	9	0	
Iaua minor	150	0	6	0	
Iazin	77	30	20	30	
Iapara	141	20	7	40	
Ierico	73	1	33	0	
Ieruſalem	72	21	33	0	
Ilmens a riuer	105	0	27	0	
Imaus a mountaine	128	0	39	0	
India Orientall	135	0	26	0	
Indus a riuer	115	29	26	0	
Inſpurg Ilands	40	41	47	50	
The three Ilands	169	21	40	9	
Ile d'eaues	310	30	11	20	
Ile d'eaues	173	50	4	30	
Ile de baſtinado	293	30	10	30	
Ile braua	1	20	12	20	
Iſlas de corales	194	40	9	50	
Ile deſierto	178	0	31	1	
Ile del fuego	22		14	21	
Ile de los fuegos	181	29	22	41	
Ile de los Galopegos maiores.	281	10	4	0	
Ile de los Galopegos minores	277	30	1	10	
Ile de Hombres blancos	169	20	5	41	
Ile de S. Iago	158	20	8		
Ile de S. Iuan	226	20	22	0	

I	Longit.		Latit.		
Ile de los Ladrones	177	21	15	11	
Ile de los Lobos	307	41	40	21	
Ile de S. Maria	296	29	37	2	S
Ile de martin vaz	10	41	21	1	
Ile de May	4	29	13	29	
Ile de S. Machael	0	0	29	29	
Ile de Negros	155	29	10	29	
Iland of fowles	33	40	50	0	
Ile de Orleance	31	0	50	29	
Ile de Paiaros	314	0	12	41	
Ile de Palmas	163	21	6	0	
Ile de Paxaros	198	51	8	51	
Ile de Paxaros	234	21	28	0	
Ile de Pearles	203	11	7	0	
Ile de Pinos	292	21	21	29	
Ile de Rees	1	20	25	21	
Ile of Salt	411	0	16	29	
Salomon Iland	204	40	10	0	
Ille of the Sunne	547	41	10	29	
Ile S. Thomæ	38	0	0	0	
Ile Saint Thomas	252	0	20	11	
Ile de Verde	353	51	45	29	
Ile de S. Vincent	175	50	8	0	
Ile de S. Vincent	73	21	20	29	
Ile de S. Catalina	334	10	27	30	S
Ile de S. Cedros	240	30	29	50	S
Ile de farnan laro	354	20	2	20	
Ile de lima	295	10	22	0	S
Ile secas	46	20	29	30	S
Ile de Triſtande Acunia	26	30	36	0	S
Ioam	135	0	7	29	
Iolofo	24	29	6	0	
Ipſwich	27	12	52	22	
Ioppe	71	22	4	0	

IKL	Longit.		Latit.	
Iſebella	305	21	18	51
Iſland	8	0	66	0
Italy Reg.	42	29	43	0
Ireland	16	0	53	29
Iucatan Reg.	288	30	18	0
Iugor	138	0	7	50
Iuica	31	21	39	30
Iulibella	66	0	1	30
K				
KAlmuchy in Tartaria	9	5	51	0
Karakithath Reg.	119	0	51	0
Caſakky Tartaria	103	0	51	0
Kithais	110	0	57	0
Kithay a Lake	123	31	53	0
Kola	54	51	69	0
Kolenig	4	11	65	10
Koſar a riuer	96	40	49	0
Kintaile	19	30	56	45
Kinſaile	15	3	52	35
L				
LAcierna	24	50	39	30
Ladena	53	30	41	31
Ladoga	62	11	61	40
Lago de los coronadus	295	1	44	0
Lampeſa	36	21	33	0
Lanearocca	11	41	29	30
Lanow	51	11	52	20
Laredo	22	51	43	0
Lariſa	70	0	33	0
Larta	53	0	46	0
Lake deGoulem	306	40	48	0
Lacus armibus	131	0	60	10
Lacus fallus	137	40	47	30

LM	Longit.	Latit.
Leon	21 11	42 15
Leon	283 41	11 21
Leopolis	52 51	49 2
Lepin	98 0	58 41
Legnio Maior	165 0	28 0
Leguio Minor	158 41	22 0
Lerida	28 21	41 30
Lester point	335 0	62 0
Lima	296 41	23 30
Limonia	72 11	44 20
Lymosa	43 29	4 50
Lions	32 41	45 40
Liorne	40 21	43 30
Lisboa	17 29	39 11
Lyzard	18 30	50 10
Lodon	95 50	51 40
London coast	326 11	72 0
Lepeso	74 1	49 41
Loyre a riuer	24 14	47 41
Longsound	34 30	58 55
Lubec	38 2	53 51
Lucka	42 11	52 0
Luky	64 0	58 21
L. Lumleys Inlet	320 0	61 0
Luna a mountaine	60 0	16 0
Lundy	19 2	51 0
Lutzke	24 0	50 21
Luzon an Iland	156 0	17 0
Lybia	33 0	23 30
Lin	29 25	52 48
Lincolne	25 25	53 22
M		
MAhoga	64 41	83 30 S
Machian	106 41	0 29
Macho enta	93 51	33 51
Macsin Iland	93 30	75 30

M	Longit.	Latit.
Macyra an Iland	62 0	19 40
Madera Ilands	8 11	31 29
Mæatis palus	71 30	40 29
Magadaxo	78 0	5 11
Magalo	71 20	9 29 S
Maida	2 40	46 40
Magallanes straights	305 0	53 25
Majorca Iland	30 31	33 0
Malibrigo	178 51	26 0
Malaca	122 30	25 1
Malaga	23 51	37 21
Maldanar an Iland	113 0	3 0
Malorca	39 51	32 51
Malta an Iland	46 0	35 31
Man an Iland	19 0	54 51
Mosambiqua	61 25	14 32
Mogada	66 34	4 0
Mamora	135 0	0 30 S
Membasa	78 15	3 20
Mangesia	61 91	41 29
Mangiorca	150 0	37 0
Manica	62 51	23 29 S
Manicongo Reg.	46 41	5 0 S
Maniola Iland	140 30	2 0
Marchant Ile	32 0	68 21
Mare de bachuor the Caspian sea.	92 0	45 0
Mare congelatum	345 0	64 0
Mare de India	120 0	10 0
Mare major	68 0	46 0
Mare mediterani-um	59 0	35 0
Mare rubrum	75 0	20 0
Mare vermeio	255 0	26 0
Mare delzur	220 10	0 0

M	Longit.	Latit.
Margarita	314 11	0 50
Marigalante	320 0	13 50
Marnios	306 21	40 40
Maroco	20 0	30 19
Marcellis	33 51	13 40
Maſalio	23 29	30 20
Milford hauen	20 5	51 48
Maſtagan	30 21	35 2
Mazaker	167 0	33 0
Madagaſcer	7 0	19 5
Maræ apana	312 10	8 0
Meander a Mountaine	152 0	31 30
Maleſtreame	6 0	67 22
Meb	46 29	34 40
Medina cely	23 29	41 10
Medina talnaby	37 0	27 20
Manilia	145 0	13 35
Medino	98 29	36 29
Middleburg	29 40	52 0
Meiſſen	41 0	51 10
Melin de Reg.	71 21	3 20 S
Melley Reg.	154	12 0
Meluing	48 1	54 50
Ments	35 51	50 0
Meſhet	85 29	52 50
Meſopotamia	78 1	5 0
Meſſana	45 51	37 50
Metz	33 29	49 45
Mien Reg.	136 1	31 0
Miens kow	56 41	54 50
Millaine	38 29	46 10
Minorca Ile	34 26	40 0
Moldauia Reg.	55 0	46 0
Molines	30 21	47 40
Mollucca Ilands	160 41	1 0

MN	Longit.	Latit.
Memorancie	130 0	47 0
Mongull Reg.	160 0	91 30
Monte de branid	47 11	30 15 S
Mont frogoſo	44 0	12 0
Mont negro	44 41	17 0
Mont raleigh	20 20	65 0
Mont royall	301 0	45 40
Morea Reg.	54 30	38 0
Moſaik	68 50	55 0
Moſandique Reg.	70 20	14 40
Muſcouia Reg.	80 0	59 0
Moskow	70 30	55 40
Moſſa	84 30	35 0
Moſſull	84 0	34 55
Mozena	24 20	34 30
Moa	96 36	21 31
Minas	165 0	36 20
Moſceneck	69 50	51 30
Munſter	35 0	52 10

N

NAbarz	79 50	50 50
Naiman Reg	140 0	64 0
Naynen	31 10	50 0
Nantes	24 10	47 50
Napoly	45 0	41 0
Napoly	55 10	38 0
Napthaly	73 0	34 30
Narbona	30 20	43 20
Nardenborg	47 10	57 50
Nartie	56 10	50 0
Nartuare	21 55	42 39
Nateph	110 30	43 0
Natolia Reg.	66 0	41 0
Nazareth	72 40	24 10
Newcaſtle	23 10	55 20
Nicaria	59 30	39 30

NO	Longit.	Latit.	
Nicober an Iland	130 30	6 40	
Nicomedia	63 30	44 20	
Nicopolis	56 30	45 0	
Nieflot	57 40	59 50	
Nilus a Riuer	67 20	32 0	
Ninus	82 20	37 0	
Niſa	36 10	44 0	
Niſſa	45 30	50 30	
Naze in Norway	31 0	58 5	
Noes a mountain	81 0	40 21	
Nolon	30 0	40 22	
Nombre de dyos	294 29	9 22	
Norumbega	315 41	43 41	
Norweigh	35 0	62 2	
Nouo gradec	57 11	53 2	
Nowgrod	65 29	52 41	
Nowgorod	62 51	60 29	
Nowgorod	80 2	55 21	
Nubia Reg.	57 2	13 0	
Nubia a Riuer	57 2	15 41	
Norenberg	39 29	49 29	
Norwich	27 15	52 45	

O.

OBy a riuer	107 1	50 0	
Occa a riuer	77 29	55 41	
Olant	43 29	57 0	
Olleron	24 29	45 29	
Olone	24 29	47 0	
Omagua Reg.	130 1	9 0	S
Omba.	54 11	66 52	
Onega a riuer	56 41	64 0	
Onegaburg	59 29	62 29	
Opawkow	64 29	53 29	
Orcades Iles	22 11	59 2	S
Orellana	343 11	3 2	
Orixa Reg.	119 1	19 2	

OP	Longit.	Latit.	
Orleans	28 29	48 2	
Ormus Ile.	93 21	26 29	
Orſa	59 51	54 21	
Orſa	41 21	61 29	
Otrona	44 29	42 40	
Otronto	49 24	40 21	
Oxenford	26 0	52 0	
Oya Reg.	75 0	13 0	
Oſtend	29 29	51 29	
Orenge	30 35	43 35	
Orliance	27 52	47 42	
Oldſound	31 36	51 35	
Orfordnes	28 0	52 15	

P

PAganſa	99 51	45 0	S
Paito	290 30	5 10	
Palagoſa	47 29	43 0	
Palandura Iland	19 8	11 0	
Palatia	60 51	39 21	
Palma Iland	6 21	28 0	S
Palona	105 10	2 0	
Pancer	120 0	41 0	
Pambolona	24 29	42 41	
Panama	394 29	8 11	
Pantanalia	42 50	36 29	
Panuco	270 11	12 20	
Pauia	270 10	12 21	
Patricks purgator	15 52	54 32	
Parris	29 25	48 29	
Parma	39 20	45 11	
Paſſan	41 50	48 41	
Paura	37 51	46 11	
Paznaſu	155 29	45 51	
Pechora	65 51	67 0	
Pechora Caſtle	73 51	64 51	
Pegu	118 0	18 21	

P	Longit.		Latit.		
Peim Reg.	132	0	51	29	
Perigo	323	11	43	21	
Pernou	53	29	58	41	
Peru Reg.	296	0	10	0	S
Perusia	142	21	43	11	
Pescara	34	29	30	11	
Phillippina Iland	158	0	15	0	
Palimbam	142	40	7	30	
Pico	356	41	38	21	
Piccora Reg.	317	0	10	2	S
Pigmea	148	41	32	2	
Pilingu	144	21	40	2	
Pina	296	21	3	1	
Pinga	101	40	14	20	S
Port de los leenes	318	0			
Piramides	173	11	20	21	
Pisa	40	29	43	41	
Pizan	73	0	51	29	
Plata	315	0	19	51	
Plimouth	21	11	50	51	
Poosko	48	11	52	41	
Plotzko	57	29	57	41	
Podolia Reg.	59	0	49	29	
Poie tiers	26	29	47	21	
Poldauid	20	5	47	55	
Polonia Reg.	53	1	50	0	S
Buen Porta	177	21	2	0	
Port de canoas	239	21	36	41	
Port de canolos	283	0	14	21	
Port de la conce	45	41	4	21	S
Port de fire	313	0	47	41	S
Port famin	302	51	53	11	S
Port fremo	44	0	4	0	S
Port del gallo	42	11	3	51	
Port de S. Miguel	240	29	35	2	
Port de nigrillo	296	51	17	11	

P Q R	Longit.		Latit.		
Prot salido	186	41	3	0	S
Port sancto	10	0	32	29	
Port S. Vincent	337	21	23	51	
Parga	42	29	50	0	
Preslaw	45	11	51	11	
Preslaw	46	41	49	45	
Port and	22	40	50	40	
Primsberg	48	30	55	11	
Prussia Reg.	50	0	54	6	
Ptolomais	66	41	29	40	
Punto de S. Helen	290	11	2	11	S
Punto de S. Helen	325	21	37	30	S
Punt de S. Lucas	152	29	23	29	
Priaman	118	0	0	20	S
Q					
Quanzu	157	29	44	10	
Quelensu	158	29	36	1	
Quiamu	144	41	42	20	
Quiloa Reg.	69	51	8	51	
Quinza	153	0	40	1	
Quito	293	11	0	11	
Quiuira	233	0	43	40	
R					
Raguſy	40	29	14	1	
Rameſes	68	29	20	30	
Rane	352	41	61	41	
Rauenna	42	21	44	21	
Rhodes	61	41	37	21	
Ryaurech	94	41	40	0	
Ribadeo	02	21	43	21	
Riga	53	30	58	0	
Reins	30	35	49	12	
Riuers					
Rio de arebodelas	331	41	1	41	S
Rio de S. Auguſt	330	0	15	30	
Rio de S. Barbara	326	41	34	1	

R	Longit.		Latit.		
Rio del Brasill	348	21	17	11	
Rio de los camarones	42	0	5	25	
Rio de Camaron	315	0	44	29	S
Rio del campo	42	29	2	51	
Rio dangla	298	41	33	11	
Rio de Canno	43	29	0	41	
Rio dulce	316	29	52	0	
Rio de S. demingo	353	0	7	51	
Rio del estremo	340	41	22	59	S
Rio de Flores	287	19	29	0	S
Rio del gado	34	21	6	21	
Rio de gigantes	278	29	29	0	
Rio grande	301	11	11	0	
Rio grande	314	29	44	0	
Rio del guato	284	29	29	29	
Rio de la hacha	304	15	10	41	
Rio de S. Helena	348	41	10	29	S
S. Laurence Riuer	318	51	53	0	
Rio de manicong.	48	21	10	0	S
Rio del Oro	10	21	22	29	
Rio de Palmas	272	11	14	21	
Rio panuco	271	51	22	29	
Rio de perla	292	29	29	0	
Rio de la plata	326	29	36	0	
Rio primero	327	41	45	0	
Rio sancto	300	29	3	0	S
Rio de spiritu san.	381	29	31	0	
The white Riuer	308	11	51	21	S
Rypon	35	29	55	21	
Roan	27	41	48	51	
Rochell	25	29	46	41	
Romey	42	29	42	0	
Roosewicke	40	21	54	0	
Rostone	7	1	57	0	
Rudia	57	29	59	21	

RS	Longit.		Latit.		
Rye	27	29	51	1	
Rio de senega	14	25	15	6	
S					
SAbarsa	154	51	45	0	
Sablestan Reg.	114	0	34	0	
Sabron	84	51	45	11	
Saendebar	174	41	35	51	
Sagatin	95	29	58	21	
Sala	49	41	48	0	
Salamanca	20	29	40	51	
Salasta	72	41	41	51	
Salina	45	0	38	29	
Salsburg	42	0	48	21	
Salstom	32	21	62	0	
Saluado	321	21	5	0	
Samaria	72	21	47	41	
Sandersons Tow.	320	0	55	29	
Hope Sanderson	326	21	72	41	
Sandry	162	51	53	0	
Sanson	20	41	43	21	
S. Crux	334	21	43	29	
S. Dauids	20	0	52	0	
S. Dominigo	307	11	17	51	
S. George	357	11	39	0	
S. Helena	54	29	13	0	S
Santiago	264	29	20	29	
Santiago	298	11	32	11	
S. Iago	175	29	2	0	
S. Iohn de luz	25	11	43	21	
S. Lazaro	71	0	11	21	S
S. Lucar	21	21	37	11	
S. Lucia	0	1	17	0	
S. Malo	24	21	47	50	
S. Maria	82	29	17	0	S
S. Maria	240	41	34	21	
S. Maria	0	19	55	0	

S	Longit.	Latit.	
S. Marics	85 1	44 29	
S. Maries of Naza	66 30	16 29	
S. Martha	301 21	10 41	
S. Martin	321 11	51 0	
S. Martins Ilands	293 40	46 51	S
S. Mathewes	21 11	1 51	S
S. Michell	60 50	65 29	
S. Micael	0 50	38 5	
S. Miguel	327 21	47 21	
S. Miguel	291 41	9 11	S
S. Miguel	268 0	24 0	
S. Miguel	249 0	32 51	
S. Nicolas	69 0	54 0	
S. Nicolas	323 21	53 41	
S. Nicolas	2 2	17 0	
S. Petro	64 29	0 29	
S. Pol de Lyon	20 41	48 48	
S. Samſon	306 29	40 29	
S. Vincent	0 29	17 29	
S. Vincent	318 41	11 51	
Sapom Iland	107 11	0 29	
Sarachi	84 29	44 11	
Saragoſa	26 11	41 51	
Sardinia	39 0	40 0	
Stayres Iland	174 11	46 30	
Sauatapoly	75 29	47 21	
Scarbrough.	34 51	54 51	
Schotland	25 0	60 0	
Scotland Reg.	20 0	57 0	
Segidin	49 0	47 11	
Seames	1 29	48 21	
Senega Reg.	13 0	24 0	
Serneti Reg.	106 29	33 29	
Saboliſher	83 41	56 20	
Shahaskik	91 29	53 9	
Shrewsbury	22 35	52 55	

S	Longit.	Latit.
Sierraleona	19 8	8 40
Skalholt	8 30	65 20
Sibier Reg.	99 20	59 30
Scicilia	45 0	37 30
Sidon	72 10	36 30
Siam	140 0	13 49
Sina a mountaine	75 0	20 0
Sinus mexico	280 0	26 0
Sinus perſia	85 0	29 0
Sion	59 10	12 40
Sipanto	45 30	41 50
Situill	18 6	37 45
Slaba	55 50	58 41
Slauonia	47 0	45 0
Slego in Ireland	15 35	54 15
Slowoda	68 20	64 30
Slowoda	86 30	58 51
Smirna	60 21	40 29
Snauell	2 30	64 21
Sorlings	18 0	50 0
Spacado	46 50	45 21
Spier	35 30	49 21
Spina	60 50	43 29
Stad	30 40	61 41
Stapholt	2 20	65 41
Stetin	42 10	53 51
Stoby	52 30	44 0
Stocholme	42 0	58 11
Straights of Tumachin	74 30	73 11
Scuedia Reg.	40 0	60 0
Sumatra an Iland	134 0	0 0
Soor	84 45	23 5
Surrat	99 24	21 7
Swally wad	99 32	21 25
Saldania bay	39 45	33 40

TS	Longit.		Latit.		
Silly	18	0	5	70	
Stert	22	50	50	40	
Sweineburnehead	25	0	59	51	
Syria	74	0	39	0	
Siracuſæ	45	41	37	0	
Southampton	24	5	51	11	
T					
TArantо	48	0	40	29	S
Tarapaca	306	21	30	41	
Tarbacan	109	29	34	51	
Targa Reg.	32	0	25	0	
Taragona	29	29	40	41	
Tarſo	71	21	40	0	
Tartar	152	0	63	21	
Tartaria Reg.	130	0	62	0	
Tasken Reg.	129	0	49	0	
Tatracan	55	0	44	51	
Tecon	116	29		41	S
Tenariffe	8	11	27	29	
Tendue Reg.	170	0	59	0	
Teneſab	46	41	61	11	
Tarceta	358	23	39	0	
Terra alta	160	29	6	51	S
Terra alta	45	21	15	21	
Ter de los fumos	322	29	40	21	S
Tharſis	115	21	49	0	
Theſſalonia	53	44	44	21	
Texell in Holland	31	0	53	15	
Thoulouſe	28	40	43	50	
Thunnis	67	40	32	0	
Tygris a Riuer	84	0	34	30	
Tocrors	54	50	46	0	
Togra	146	0	49	50	
Toiled o	22	20	39	40	
Tollon	34	5	43	20	
Toni	33	10	49	10	

TV	Longit.		Latit.		
Toures	27	30	47	50	
Trent	40	10	26	10	
Triago an Iland	278	40	21	0	
Tribanta	63	30	41	50	
Trinidad	355	20	19	10	S
Trinidad	295	50	21	20	
Trinidad	319	20	9	0	
Trynity Arbor	308	30	36	0	
Tripolis antiqua	44	21	30	20	
Tripolis in Barba.	45	21	30	30	
Tripolis ſoria	72	21	37	0	
Troyia	59	0	42	30	
Troy	31	0	48	10	
Tuna	41	51	64	30	
Turſon	131	30	56	30	
Tyrus	71	35	35	30	
Tzeroas	79	50	49	20	
Talao	159	0	3	30	
Ternate	160	12	0	30	
Tidore	160	15	0	10	
Timor	139	12	10	26	S
V					
VAlentia	29	20	39	41	
Varcano	107	50	39	0	
Varon	83	30	70	30	
Vaygats an Iland	81	30	69	21	
Venice	41	40	45	51	
Verma Reg.	133	0	21	30	
Varona	40	40	45	50	
Virna	17	30	42	0	
Viatea	87	50	59	30	
Vienna	45	30	48	30	
Villa longa	28	20	7	40	
Ville conde	17	30	41	30	
Virginia	302	10	36	0	
Vſhgrod	61	30	51	30	

VW	Longit.	Latit.
Bona Vista	4 30	15 30
Buena Vista	308	40 40 11
Buena Vista	177	30 13 30
Vin	37	50 48 50
Volga a riuer	75	40 58 0
Vpsalia	42	50 60 0
Vigis a riuer	85	50 53 20
Visting	79	30 61 30
W		
VVAersberghen	39	1 57 30
Wardhouse	50	30 70 26
Earle Warwicks foreland	323	11 62 1
Waterford	17	15 52 16
Count Warwick sound	330	41 64 41
Wakefield	23	48 53 45
Wasilgo rode	81	50 56 41
Waxon	49	20 52 29
Weimouth	23	50 51 0
Welichy	96	30 56 0
We ikipoyassa	101	20 63 29
Wolifz	63	40 59 51
Weroy	39	50 68 41
Wesel	21	29 51 29
Westerhold	40	29 67 41
Whitbay	24	26 55 0
Wiborough	56	29 62 35
Wight Ile	25	11 50 29
Sr. Hugh Willoby Land	55	0 75 0
Winterton	27	20 53 29
Wologda	73	50 59 29
Wologda	74	30 60 0

XYZ	Longit.	Latit.
X		
XAques	282	20 20 29
Y		
YArmouth	27	30 53 0
Yorke	23	30 54 29
Yuagua	303	30 21 0
Yuchcope	22	56 56 20
Z		
ZAcana a riuer	60	40 13 0S
Zacatula	269	40 20 0
Zacoton an Iland	88	0 12 51
Zama	49	30 14 0S
Zama	74	41 11 41
Zeilam	104	0 8 0
Zanhage Reg.	20	0 24 0
Zanziber	73	52 5 29S
Zara	46	25 45 41
Zaradrus a riuer	126	0 94 0
Zauan	41	29 51 0
Zedica	48	0 29 29
Zegzeg Reg.	36	41 14 41
Zoua Zembla	83	29 74 0
Zinguis	76	11 49 29
Zoidalanell	137	31 3 51
Zuenziga Reg.	25	0 25 0

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